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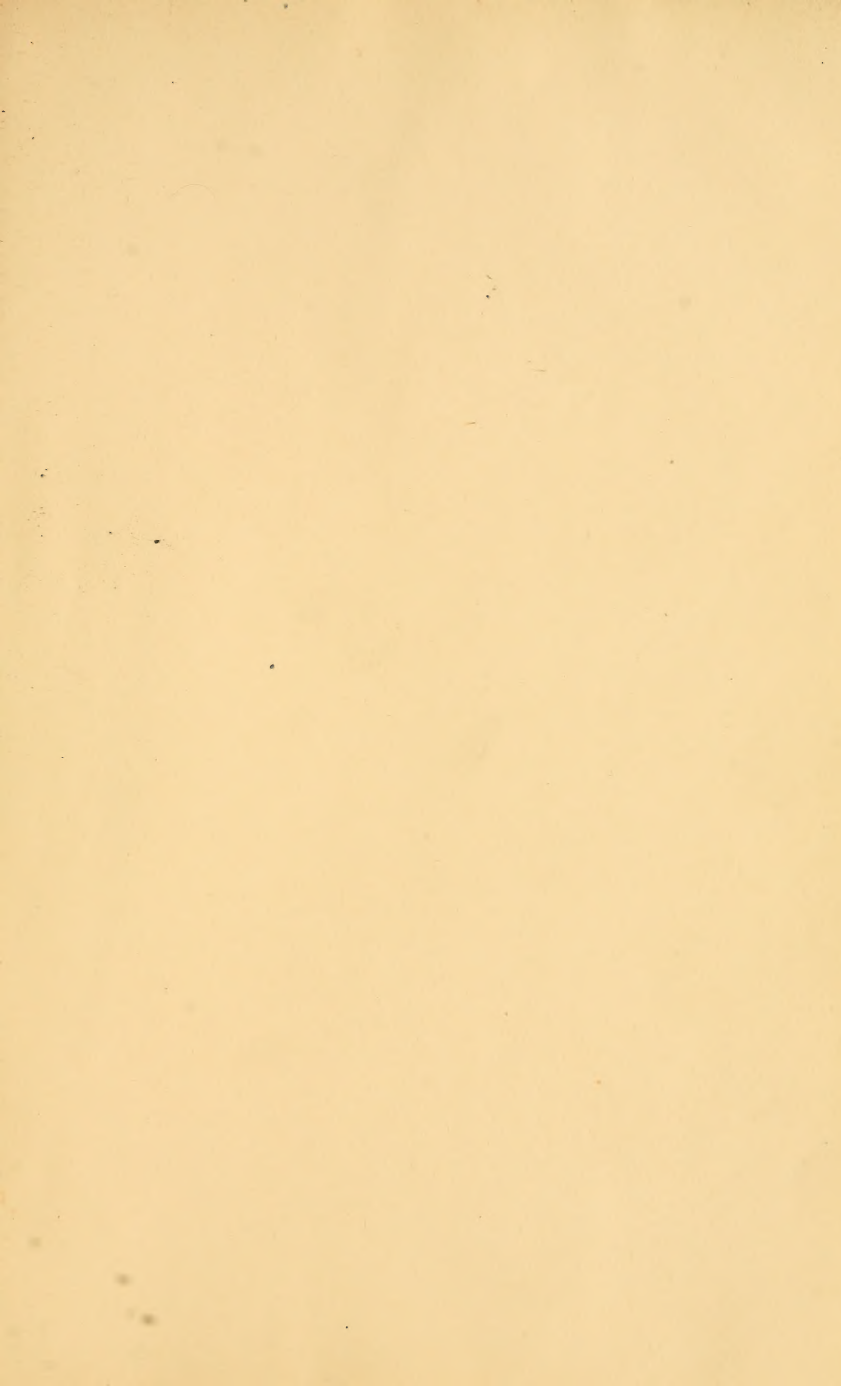
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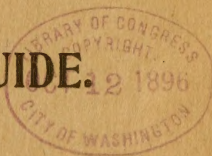
No. 2.



The Young Market Gardener.



BEGINNER'S GUIDE.







The Young MARKET GARDENER

BEGINNER'S GUIDE.

PART I.—A LITTLE PIT WELL BUILT.

PART II.—A LITTLE PLAT WELL TILLED.

PART III.—A LITTLE PURSE WELL FILLED.

ILLUSTRATED.

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revised
BY T. GREINER. *unseen*

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SPRING, 1896.

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WRITER'S REASON.

AN INTRODUCTION.

FOR years I and other enthusiastic writers have been telling, in books and periodicals, about the pleasures and profits to be found in gardening. This has had its effects. One of these effects is the readiness with which many young people, when they see that their father's farming does not yield satis-

The Effects. factory returns, or when they become dissatisfied with their condition in life, and their mode of earning their living as clerks, teachers, railroad employes, etc., turn to market gardening as a supposedly more profitable business, and an occupation which, perhaps, may afford them a life of greater ease. The moths are drawn to the light. When I see this one effect of our teachings, I sometimes fear that we have overstated our case,

and that our golden promises are attracting some young people with the same effect to them that being drawn to the light has upon the moths.

On the other hand, we cannot leave everything in absolute darkness for the sake of saving the fool-flies which, instead of being guided by a clear light, are only blinded by it and drawn into their own destruction. The light is needed. As another effect of our teachings, thousands of people are enabled to make a fair living as market gardeners, and tens of thousands have good home gardens, and enjoy the blessings found in well-arranged beds, thrifty vegetation, and a full home supply of fresh vegetables and fruits.

Anyone who expects to find in market gardening a combination of "big profits and a life of ease," makes a big mistake, and will find his wings badly singed on the first contact with reality. Anyone who earns fair wages in other occupations, as clerk, station agent, butcher or preacher, but thinks he can do better in market gardening, of which, as yet, he knows nothing, is only taking a leap from a safe and solid bank upon very thin ice. All the chances are against success. And when the new recruit imagines himself to be smarter than all the rest of mankind, and thinks his final success is a dead-sure thing anyway, I consider his case entirely hopeless. These people are not the ones for whom this book is chiefly intended. Before they can hope to become successful market gardeners, they must go through a course of practical training in tilling the soil, either by hiring out to a successful market gardener for at least a year or

two, or by starting with a home garden and gradually extending it into commercial operations.

People with a natural liking for garden work, and having had some practical experience with it, are the ones who will make a success of it. They know that success is worth some effort, and they will be willing to work—and work hard—for it. At some seasons of the year long working hours are unavoidable; at other times the work is less pressing. But whether requiring eighteen hours a day or six hours, it is an occupation that suits their tastes and keeps them interested all the time. This class of recruits in market gardening usually know that they must “look before they leap,” and, wisely, they seek information wherever it can be had. For the people with an earnest purpose in view, people who are willing to succeed by close application to their business and all its details, this treatise is alone intended. They often overwhelm me with questions about the business in general, the markets, the crops, greenhouse building, hot-bed construction and management, etc., and in some way I have to answer them. It is, therefore, a condition and not a theory that confronts me. In publishing this book I simply yield to necessity.

Having given the *raison d’etre*, I do not deem it necessary to make further excuses for my temerity. Quite the contrary. I know this information is needed. It fills a gap. I expect that it will be a welcome help to the class of people for which it is intended.

* * *

True, it is the man himself, in the first place, on

whom the outcome depends. The true gardener can succeed even if the surroundings are not especially favorable. So also can a person of quite inferior abilities make a half success of an undertaking when he happens to be placed amid especially favorable conditions. But it requires the happy combination of the right man and the right place for a whole and unqualified success. It is not safe even for the right man to take hold of market gardening as a life-business under just the local conditions in which he happens to be placed. He will not be satisfied with earning barely enough to live, and to pay him for his actual work at current rates of labor. He wants something for good management, and for the exercise of good judgment. He is entitled to pay for head work as well as hand work. The question then resolves itself into two parts, viz: (1) Who is the right man? (2) Where is the right place?

In a general way I have already designated the right man as the one who has a natural talent and love, inborn or acquired, for garden work. This, however, is by no means all of it. There are two great problems which the successful market gardener must solve, namely: first, to *grow* garden products; and second, to *sell* them. He has to assume the role not only of gardener, but also of salesman. Frequently the last-named task is by far the most important, and the most difficult. Yet if he excels in either one, it will materially help him in the other. Superior products sell themselves; but it takes a good salesman to obtain satisfactory prices for ordinary stuff,

**Who is
the Man?**

The Right Man.

when there is much competition. And competition we must expect, and prepare for. The right man, therefore, is in the first place a good gardener, who, by close application and by the utilization of all means of progress, keeps ahead of the rank and file, and consequently produces earlier vegetables or better ones, than his competitors bring into the market. He is also a good salesman, packing his products in attractive shape, and bringing them as regularly as clockwork to his customers whom he selects in accordance with the quality of his products. There are always plenty of people who appreciate a good article and are willing to pay for it. The producers of trash must find sale in the Italian or Negro quarters of the cities, and accept any price that this class of purchasers are willing to pay.

The right man, too, must have a little capital. It is always best if he has a place of his own, and this need not be large. Much can be done on a very few acres of land. If land is plentiful

Capital Required. and cheap, he may have a sufficiency to support horse and cow. Otherwise five acres would be enough for a start. The capital should be sufficient to pay for the place and the implements and equipment needed. Among the latter is a small forcing pit or greenhouse and a number of hot-bed sashes. Outside of the place and horse, \$400 or \$500 might answer for a small beginning. There is no need of going beyond the reach of one's available capital. If the business does not prove profitable, the less money invested the better. If it turns out as anticipated, the profits from it will soon put

the right man in the situation to extend his operations. In a few years' time much can be done from even a very modest start. Large oaks from little acorns grow, you know.

But the right man should also be in the right place, such a place, namely, which gives him the opportunities required not only to grow good produce, but also to sell it. No use growing anything that you cannot sell. A good near market, indeed, is a consideration of first importance. It is not always—nor even ordinarily—the largest city which affords the best market. There are plenty of small cities and towns where better prices can be obtained for garden products than in New York City, Boston or Philadelphia. The large cities are usually well supplied and often overstocked, while many inland towns are not even decently provided with good garden products. By all means and above all things look out for a good market. In the selection of soil I would give a naturally-drained, warm, sandy loam the preference. There is always a premium on earliness. You should have at least a little spot of such warm soil, protected by buildings, tree belts, or in some other way, at the North and West, and perhaps slightly sloping to South or Southeast. Some of the land may be of a more clayey or mucky character. This may come handy for some crops. If the farm or any part of it affords natural opportunities for irrigation, this is a chance not to be neglected. Excessive richness of the soil is not an indispensable condition. If the soil is in a good state of fertility, all the better. But I would

rather take the poorest soil of the right composition (warm loam) and in the right place, depending on the indispensable annual manure applications to make it rich, than the very richest soil of undesirable character, or undesirably located. In short, the right place is a matter of the greatest consequence, and the right man will examine pretty closely into all the minutest details of surrounding conditions before he makes the selection. If previous choice, or accident has already placed him in a locality which seems reasonably favorable to the business, then all he can do is to make the most of his opportunities.

* * *

In the foregoing, I think, I have stated all that I or anybody else could say on the question whether it is advisable or not for an inquirer (young or old) to take up market gardening as a business. We can give only general rules. In the application, good judgment must do the rest.

T. GREINER.

LA SALLE, N. Y., Spring, 1896.

PART I.

“A LITTLE PIT WELL BUILT.”

GREENHOUSES AND HOT-BEDS.— CON-
STRUCTION, HEATING
AND USE.



“HE WHO LOVES A GARDEN, LOVES A GREEN-
HOUSE, TOO.”

CHAPTER I.

BEGINNER'S GREENHOUSES.

WITHOUT an opportunity to grow vegetables and plants under glass when the ground is deeply frozen or covered foot-deep with snow, one necessary feature of home gardening is missing. A greenhouse, be it ever so small, is needed to complete the model rural home. Its absence, however, only shows that the owner neglects to utilize, to the fullest extent, all the privileges which the rural home affords. It means less comfort, less pleasure, but no loss of a more serious character. For the market gardener, on the other hand, the possession of a greenhouse or forcing pit is absolutely indispensable. The measure of success in market gardening depends chiefly on being one of the "early birds." Competition is often close. Vegetables grown entirely in open air, and at their regular season, when everybody has them, are cheap. The profits are mostly in green stuff and fruits produced early, even if only a few days in advance of the rush. In this respect, the gardener who works only with hot-beds and cold-frames cannot compete

An Absolute
Need.

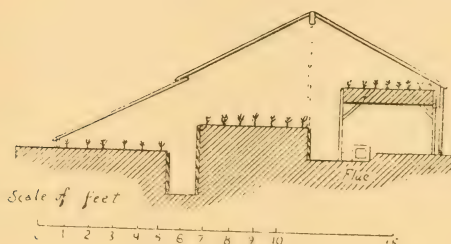
with those who have the advantage of greenhouse facilities. Without the efficient aid of the latter, the former can only give half returns and a half success at best. In short, the greenhouse is the first of all equipments which the market gardener needs. With him this is a question of success or failure. It is for this reason that I have included the cost of a greenhouse in my estimate of capital required for a start.

The location of the greenhouse is of some importance. It should be in convenient proximity to the dwelling house. Under some circumstances it might be built as a south or east wing or lean-to. If you have a spot protected at the north and west by trees, tall hedges, buildings, or a board fence, such a location, in short, as one would select for hot-beds and cold-frames, that also is the proper site for the greenhouse. Some protection of this kind makes a material difference. Here the west side of a double-span greenhouse fully exposed to the cold winds, is several degrees colder than the east side.

The next thing to consider is the size of the house or pit. It is true that a large house can be heated more economically than a smaller one; but my advice is always to go slow. The young market gardener, who has neither a sufficiency of experience in managing a greenhouse, nor a surplus of capital, can get along very well with quite a small greenhouse. It is better and safer than to begin with a larger and more costly one. The chief aim is the production of the early plants with which to plant the place, and some surplus to sell. A great

deal can be done in this line in a small greenhouse, and with the aid of a number of cold-frames. Sometimes a lot of sashes are on hand, or can be purchased second-hand at an almost nominal sum. You will need a score or more for cold-frames, but if there are more of them than required for that purpose, they might be used in the construction of a cheap pit, something like the one here illustrated.

Put up a simple frame, three-quarter span, and



MAKE-SHIFT FORCING PITs.

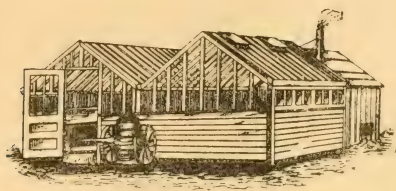
board up at the ends and back. These walls, of course, should be double, and filled with sawdust, as will be described in detail later on. Three rows of ordinary hot-bed sashes, some of them hinged to serve as ventilators, form the roof. An ordinary greenhouse bench is set up against the back wall, close to the glass. The other two benches are solid earth beds, the lower one on the ground level. A pit may be dug for a fire place, and the flue placed under the upper bench. If there is a return flue, placed right on top of the

lower one, and the chimney immediately above the fire-place, the draught will be excellent. Among the advantages of this plan of putting up a greenhouse are, first, cheapness. The few boards and scantlings needed for the frame can be found lying about on almost any place, or bought for little money. Anybody of ordinary intelligence and mechanical skill can put up the frame. Then, the flue being on one side, gives a chance to raise all the different vegetable plants. The high bed furthest back, over the flue, will be the warmest. Here you can start tomato, pepper and egg-plants, etc., or use it for forcing cucumbers, tomatoes, etc. The next bed, in the centre, which is somewhat cooler, may be used for tomato, pepper, early cabbage and similar plants after they are well started, also for forcing lettuce, radishes, etc. The bed on the ground level is the coolest and just right for growing onion plants. If you are not afraid to invest an extra \$100 or so, however, better put in a hot-water heater, with the necessary pipes. The house will be managed with one-half the labor, and double the satisfaction to the owner.

The house or pit just described, however, is a make-shift at best. I believe that what is worth doing at all, is worth doing well. When anyone engages in market gardening as a permanent business—and it is not worth while to engage in it for a year or two—he might just as well put up a building for permanent service, and one which will give the advantages of greatest efficiency, greatest convenience and greatest satisfaction generally. Then, as the increasing business demands increased green-

house facilities, additions can be made from time to time as needed.

My little greenhouse, shown here in perspective (engraved from photo), was intended solely for amateur purposes, and in this respect I consider



SMALL GREENHOUSE.

it nearly perfect. But I find it fully large enough for a modest start in market gardening and if a somewhat larger house should be preferred, a few feet might be easily added to its length, at little additional cost. The building is heated by means of one of Hitchings & Co.'s base-burning water heaters, and four lines of two-inch gas pipe, requiring a moderate amount of coal, and but little attention. The whole building, heating apparatus and all, was put up at a cost of about \$250, and a little of my own work and supervision.

CHAPTER II.

DETAILS OF GREENHOUSE CONSTRUCTION.

THE building, as was shown in illustration in preceding chapter, is a double span, each span being ten feet wide and sixteen feet long. The wood-work, posts and boards excepted, consists of southern cypress, and was purchased, ready for putting together, from one of the firm's advertising such lumber in the columns of horticultural journals. The first task was the selection of the proper site—one with good southeastern exposure and some protection at the north and west, and affording a good chance of drainage for the furnace pit. Set permanent posts reaching below the frost line, and attach the structure to these. Then we want warm walls. Fuel in most parts of the country is expensive. It is much cheaper to take pains in the construction of greenhouse walls, so that no heat can escape through them. They ought to be built of

hollow brick, or of two tiers of brick with a dead-air space between. This is all right, but I have used double board walls and sawdust filling, as illustrated. Matched boards (hemlock or other cheap lumber) are nailed on outside of posts. Then comes a layer of building paper which is one of the poorest conductors of heat, and upon this the clapboards. After the frame is all up, the walls are finished by boarding up on the inside of posts, from the bottom up. A strip of building paper comes first, then boards. As the side is gradually closed up, the hollow spaces in the centre of the wall are filled with dry sawdust tightly packed down. If everything is done properly there cannot be much waste of heat through these walls, as they consist of three thicknesses of board, two thicknesses of building paper and a four-inch layer of dry sawdust. Be sure to have everything snug and tight. The saving in coal will abundantly repay a little extra pains taken with the walls as well as with other parts of the house.

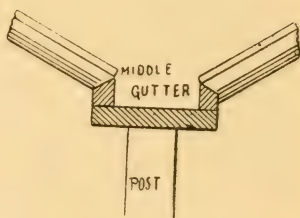
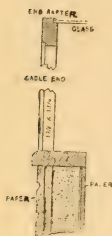


I make the walls as high as the top of benches. The side posts extend eighteen inches above the plates (or wall caps) and support the side gutters (see cut, post not shown).

This eighteen-inch space, all along the sides of the building, is closed in by means of hinged sashes.

The gable ends, except the one at the northeast end which joins the furnace room, and is boarded up, are constructed as shown in cut. The vertical bars ($1\frac{3}{8}$ by $1\frac{1}{4}$ inches) rest upon the gable plate, and

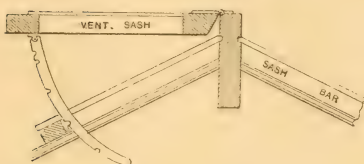
extend to the end rafter, placed at proper distance for taking 14-inch glass. The large door with sash top is in the center of the southwest gable end, facing the dwelling house. If the latter were on the other (north) side of greenhouse, I would have the door in the northwest gable end, which arrangement I would like better. The middle gutter is shown in next figure. The posts set at equal distances from each other and from the outside posts, inside of the building, support it, and keep it from sagging in the center. This gutter, as well as the side gutters, and with them the whole structure, must have a slight deviation from the horizontal line, in order to give rain and snow-water a chance to run off one way or the other, preferably towards the south.



The most important part of building is the roof. This should admit plenty of light and yet retain the heat well. We might cover the greenhouse with sashes like those used for hot beds and cold frames; but they are clumsy, with big frames, and consequently they obstruct the light more than permanent sash bars. I greatly prefer the latter. The roof bars on my greenhouse are of the pattern here shown, and they are placed far enough apart to accommodate 14-inch glass, same as at the gable ends. Large sized glass gives the best light, of course. Each

span has two ventilators, 14 x 16 inches, hinged to ridge plate (see illustration), and these, as well as side sashes, are worked by iron lifting rods of simple construction.

I prefer glass of double thickness, the regular greenhouse glass. As it is not to be lapped but “butted,” that is, simply placed together edge to edge, great care must be exercised to have the panes fit well together, in order to leave no openings. It will pay to take a good deal of pains to do this job



well. Some people advise to put a film of white lead between the two edges, in order to make a close, tight joint. I do not find this to be necessary. The glass is supposed to be cut square and straight. Yet there are always slight variations to be found, and if one pane does not fit well to one already put in place, another should be tried, and if this does not give a perfect fit, still another. When the glass is once laid in this careful manner, you have a roof that is as perfect as any glass roof can be made. There is no drip worth mentioning. There are no

tins, no lapped glass, to obstruct the passage of the light, and moreover the glass lays smoothly and evenly on the projection of the sash bar, and is held down firmly by the cap. Then we avoid the puttying nuisance. We do use a little soft putty in which to bed the glass, but none on top of the glass. The liquid putty bulb (catalogued by seedsmen) is a handy thing for applying putty in this manner.

The way to make the putty is as follows:

Soft Putty. Use one-third in bulk each of common putty, boiled oil and white lead. Stir the putty into the oil, then add the lead. Mix all thoroughly together and then strain. Then fill the bulb full of the mixture and use it as you would an oil can. Pour just a thin line of this soft putty along the sash bars on each side, and bed the glass in it, and then screw on the cap.

The only place of weakness is where the glass joins the ridge plate. Here we may find openings and leaks. I prefer to use ordinary putty, from the outside, and closing the groove above the glass. I am very much in love with butting the glass and greatly prefer it to lapping or any other style. If there are slight cracks left, they will do little harm. In fact they act as automatic ventilators. They are open when the weather is mild. Frost closes them tightly in cold weather. Proper attention must be paid to ventilators, so that they fit snugly and tightly. If they do not, they may allow much heat to escape in cold weather. When I noticed considerable leak through the ventilators late last fall, I fitted in felt weather strips and stopped the leaks. The house has been much warmer since. In short,

every effort must be made to retain as much as possible of the heat during the cold weather. Heat represents coal, and coal money.

The same pains of fitting in the glass as recommended for the roof must be taken with the gable ends. Again I butt,

**Glassing the
Gable Ends.**

not lap the panes.

The cut represents a section of the vertical gable bar, glassed and finished. I dislike to use putty on the outside, and have used corner moulding as shown. I am unable to see, how-

ever, why the parties who get out cypress lumber for greenhouses do not fit the gable bars with caps, giving us an arrangement as here illustrated and somewhat like the roof bars. I asked the Lockland Lumber Co. why they did not, and they replied there was no reason for the omission, and that the idea was a good one.

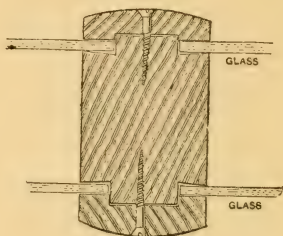
Where the winters are expected to bring occasionally quite cold weather, as here and further North, it may be well to take extra precautions to exclude the cold, or rather to confine the warmth in the building. I have put double panes in the side sashes and also in the gables (doors included) of the west span. It is easy enough to fix the gable ends in this way. I have fitted in the panes against the inside of bar, as shown, and fastened them by means of a strip of wood to correspond with the



width of gable bar in length, and being one-quarter inch in thickness. A few screws hold this and the panes firmly. But when I put up another greenhouse, I shall have the gable bars made as here illustrated, namely, fitted for regular caps



on the inside as well as on the outside. This double glass protection works well. It has made my greenhouse perceptibly warmer, and this at a small expense for extra glass. I cannot emphasize the importance of this one feature too strongly. Every opening, every leak, gives a chance for the heat to escape, and in a very cold spell may endanger the plants. The tighter and the better secured all the sides and the roof, the less coal will be needed, and the more cheaply and safely the greenhouse can be run.



CHAPTER III.

HEATING THE GREENHOUSE.

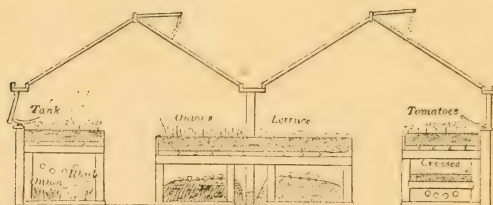
BEFORE the benches can be put in, the hot water pipes must be properly arranged. The first question comes, what sized pipes to use and how many feet of them. You can use either 4-inch cast iron pipes or ordinary 2-inch gas pipe. I prefer the latter, as they are more easily handled and fitted.

Heating
the Greenhouse.

My greenhouse has about 160 running feet of this 2-inch pipe, or a little less than one foot to each three square feet of glass surface. This seems to answer every purpose when it is intended to grow only hardy vegetables during the winter. But as we may wish to start plants requiring more heat, and in order to be on the safe side anyway, it would be preferable to put in at least 200 feet of 2-inch pipe, or one foot to every two and a half of glass surface. We might easily arrange it so that there would be some extra piping in the east span, in order to make this a little warmer, and thus fit it for plants of a more tender nature. I use a base-burning water heater (made by Hitchings & Co., of New York; price about \$45).

Boilers of larger size, of course, will be required for larger buildings. This base-burning heater is economical in the use of coal, and requires but little attention. In fact, it almost "runs itself."

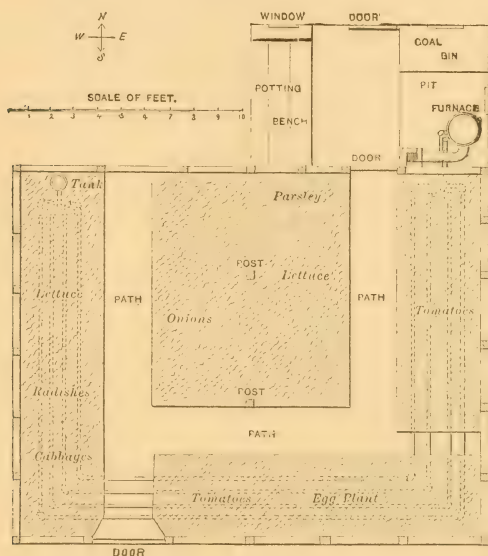
The hot-water heater is set into a pit north of the east span, deep enough so that the pipes where they enter the greenhouse are level with the ground. The chimney may be close to the heater, and must extend somewhat beyond the ridges of the house in order to secure good draft. Every precaution should be taken to avoid risk of taking fire. There is a brick foundation and sewer pipe for the upper part of chimney. Of course you can fit this to suit circumstances. Only be sure to have good draft, and security from catching fire. One end of the pit is partitioned off for a coal bin. The accompanying



CROSS SECTION OF GREENHOUSE.

illustrations will give an idea of the arrangement of the pipes, which are all 2-inch gas pipe. The two outer pipes are all flow pipes, connecting with the upper opening of the boiler; the inner pipes are the returns, connecting with the lower opening. There is a gradual rise from the boiler upwards, the portion connecting with the tank at the northwest corner of

the building being the highest. The tank rises above the bench. It is not necessary to have a metal tank, with the water guage, etc., as mine happens to be. A keg, open on top, and with $1\frac{1}{4}$ -inch pipe connecting with water circulation, entering from bottom of keg or from side near the bottom, will answer the purpose just as well. A cover is



GROUND PLAN OF GREENHOUSE.

easily fitted to the keg, and a glance inside, when this cover is lifted up, will show whether water is needed or not. I have to add a bucketful or less a week, that is all.

People who have no idea of the arrangement of pipes and how to get them together may need the

services of a regular plumber. I always do this work myself; indeed, I enjoy it. If you draw a plan on the one-inch-to-the-foot scale, like an enlargement of ground plan here shown, you (or the party who is to furnish you the piping), can get the correct length of every piece of pipe; and when you have that, it is easy to put the whole thing together. The chances are, however, that you will have to go back to the hardware, for fixings or cuttings of pipe, more than once. No need of using lead in the joints. The whole system, when well screwed together, will be perfectly water-tight.

In the first section of pipe nearest the furnace (at right of illustration) the pipes are near the ground, and when we build the bench over them, we make this a double one, as shown in cross section. The lower bench can be quite shallow, but should be water-tight, and a portion of it can then be used as "water bench" for watering (from the bottom up) the flats with transplanted seedlings or the newly-seeded flats. Another portion may be used for water cresses, or even ordinary cresses, etc. In consequence of the necessary gradual rise, the pipes where they pass the main door in front are somewhat in the way, and I had to build a bridge or step over them. This is not a serious defect, however, and would have been avoided in a house located on the other side of residence, by having the main door in opposite end. This arrangement of the pipes gives good satisfaction, and it is simple. I am not sure, however, that it is the best that could be devised. I like as much space as possible, both on and under the benches. The pipes, especially at south

side of house, take up considerable of the under-bench space. The space under the benches could all have been saved for planting with rhubarb, asparagus, cresses, mushrooms, bunching onions, etc., if the pipes were placed alongside the inner walls, one above the other. The water is filled into the tank until well up to the top, and kept there. The gradual rise allows all the air in the pipes to escape through the tank. Then fire up and keep the fire going, which is an easy enough thing, especially after one gets thoroughly acquainted with the heater. In the regulation of the furnace and working the drafts, according to the conditions of the weather, as also in the use of the ventilators, you will have to follow the dictates of common sense.

It cannot be my purpose or task to give plans of elaborate houses. People who wish to build large, expensive or ornamental greenhouses, should study

Other Houses.

Prof. Taft's book on greenhouse construction (price, \$1.50), or visit some of the establishments of florists or seedsmen, for the inspection of their houses, or still better, employ a professional greenhouse builder. Sometimes it becomes necessary to put up a greenhouse for only temporary use. Then it might do to make the roof of portable sashes, and board up the sides clear to the gutters. But by using screws and bolts in place of nails, the whole roof can be taken down and re-erected elsewhere, even if made of "permanent" sash bars. It is not absolutely necessary to have the more expensive cypress sash bars with drip grooves. I find no necessity for such grooves in my greenhouse. Some water is condensed on the inside

of the glass, and runs down to the gutters, where it is caught in miniature gutters and collected. But I have never seen any water running down in the drip grooves. These permanent sash bars might be just as well made of clear pine, and plain square in shape, instead of the dearer, although more lasting cypress. I would prefer the regular grooved caps.

Hillsides with a southern slope of about 25 degrees, offer superior advantages to the grower of forced vegetables. A lean-to, or sections of lean-to, can here be easily and cheaply erected. A good width

of each lean-to is from ten to twelve
Sidehill Houses. feet. The walls can be built the same

as for any greenhouse, although possibly there may be no necessity of making them double and with sawdust filling or dead-air spaces, since they are to be banked up clear to the gutters. Of course there is a gutter on posts between each two sections, the top of the ridge being connected with the gutter north of it by board or glass ventilators.

Walks are dug out right in center of each house, so that there is a bed directly on the ground, from four to five feet in width at each side of walk. The sash bars are to be laid at the same angle as the slope of the hill. The heating pipes are arranged along the sides of the walks, and should be distributed so that the lower houses will have their full share of the heat, unless these are intended for growing hardier plants than are grown in the upper house or houses. The heat, of course, rises to the top. If pipes are distributed evenly over the whole, plants needing more heat, such as tomatoes, peppers, egg plants, etc., may be grown in the upper house or houses,

while the lower ones are devoted to onions, lettuce, cabbage, cauliflower, etc. Such a hillside, indeed, is a bonanza for the young market gardener, if properly utilized, both in forcing vegetables and in their open-air production. A lean-to house of the kind described, can be put up with less expense than any other greenhouse, and will require less fuel to keep it properly heated. Then there is no need of making benches, and the bench supports never rot away. The face of the hill gives the bench and bed. Sidehill houses of this description have been found satisfactory whenever used, and they have been used to some extent here, and quite commonly in Europe. The young beginner, with little means for a start, but fortunate enough to have such a hillside close to his dwelling, can do far worse, in putting up a structure for growing plants and forcing vegetables, than build a side-hill house of this kind.

CHAPTER IV.

USE OF THE GREENHOUSE.

THE chief purpose for which the young market gardener builds and maintains his greenhouse, and his cold frames as well, is for raising the plants that he may need for his own setting, and enough to supply the demand he may have for them at retail rates. Plants at ordinary retail prices usually pay much better than crops for the table. The chief energies of the gardener must be spent in the task of growing good and early plants for own use. The money is in the earliest crops. The cabbages that can be brought into the market a few days in advance of other people's crops, the tomatoes and egg plants and onions, etc., that are put on sale before the rush, are the ones that bring good prices

and pay well. Later on, when the markets are flooded with all these vegetables, it is often uphill work to secure a paying price for cabbages, tomatoes, onions, etc. The production of such late crops should in many instances be left to the farm gardener, who plants large areas, raises ordinary crops cheaply, and expects to meet competition by cheap prices.

Forcing vegetables, unless it is intended to be made a specialty, is only an incident, and the young market gardener's greenhouse is used for the production of forced lettuces, radishes, etc., only during fall or early winter, or previous to the time when every space is needed for plant growing, and for the production of forced tomatoes, cucumbers, etc., only during spring, after the plants have been taken out to frames or open ground. But if properly run, the house should stand empty only for a very short time during the hottest part of the season.

A most important point is the timely preparation of the soil needed for the benches, the flats, hot beds and cold frames. This can hardly be prepared too

**Bench and
Potting Soil.**

far in advance. It is none too early to get the materials together in the spring, and too late if put off until after early summer. Two kinds of soil are needed; one for plant growing and another for forcing vegetables. For the production of succulent vegetables, especially lettuce and radishes, the soil must be very rich in order to give us quick growth and sweet, tender leaves or roots. About as good a mixture as I ever found for this purpose consists of one part each (more or less) of old horse or cow manure,

dried muck, sand and old sods. Be sure to prepare enough of this, for usually quite a quantity is needed. For a small greenhouse, such as I have described, and for the cold frames connected with it, a good, plump load of each of the four ingredients may answer. Throw all these materials into a square heap, say three feet high, and fork or spade them over thoroughly at least once a month. If the mixture can be kept under shelter, all the better. If very dry, soap suds from the wash-house, or liquid manure, may be thrown upon it from time to time. In October, when wanted for the benches, the compost should be one homogeneous mass. Sift it through a coarse sieve and use the sifted part for the benches.

This, or a similar compost, however, excellent as we always find it for the purpose named, will not answer to grow plants in. It is by far too rich, and therefore not safe to use, when we want strong, stiff, but short and stocky plants. Excessively rich soil gives us the sappy, succulent growth which we so much admire in lettuce or radishes, and find so undesirable in plants grown for setting in open ground. The soil for the latter should be a fibrous loam of medium fertility, and there can be nothing superior to a compost of clear sods taken from an old pasture or from an old fence row. The soil there is just about rich enough for our purposes, and the grass roots furnish the fibres which bind the soil together, and help it to adhere firmly to the roots of plants to be taken up and re-set "with a chunk of soil." Of course, it takes considerable time for freshly cut sods to rot down and make good plant soil. We

will have use for a good deal of it, too, in flats, pots, frames, etc. Cut the sods a year ahead, if possible, or not later than spring, for next winter's use. Pile them up in a square heap in any convenient spot, and leave them to rot. If very dry, you may pour water or slops upon the heap from time to time. A few months later, dig the heap over with the spade or fork, chopping the sods to pieces as best as you can. Make a new heap, and again leave for a few weeks, when it should be dug over once more. Keep at it until you have a nice mellow loam, which you will find is just the thing you want to raise plants in. If it is somewhat poor, you may add a small quantity of old, fine compost, but in most cases this will not be necessary, and perhaps be a detriment rather than an advantage.

Be sure to attend to this matter in time. Right here is where many novices fail. We are all quite liable to put such odd jobs off from day to day. Then come regret, and frantic efforts to find a substitute for what we might have secured so easily in its proper time. Possibly the ground has become thoroughly soaked with fall rains, or frozen up solid, when we want to use the soil, and we will have to hunt in cellars, and under barns and sheds, etc., for some kind of soil that will not give us half the good results, half the satisfaction, half the profits, that we would have obtained by the use of properly prepared compost.

This we must bear in mind, that competition has become very close, and often formidable. City markets are now almost as well provided with fresh vegetables (from the South) during the winter, as

they are with home-grown products during the summer. This abundance of southern green stuff effectively bars out

Crowding Crops. every chance of a generally high schedule of prices. Only very choice vegetables, now-a-days, will bring a fancy figure. The average run has to be sold at moderate prices at best, except in special retail market. But the young market gardener, who has the opportunity of selling directly to the consumers who appreciate nice, crisp forced vegetables, can certainly find profit in their production, at the rates consumers are usually willing to pay for their small quantities, especially if he has learned to crowd crops. This is a principle applicable both to culture in open air and under glass.

Lettuce is the first crop to be produced. We begin to raise our plants in August and September, and to set them on the greenhouse bench in October.

Forcing Lettuce. The plants may be started in some suitable spot outdoors, where they are given space enough so that they can be taken up with some soil adhering to their roots, and thus carefully transferred to the greenhouse. They should not resent this transfer, but rather grow right along and produce marketable heads by Thanksgiving (last week in November). The first crop, owing to much clear and warm weather, usually grows rapidly, and will need a good deal of water and careful ventilation. Sub-irrigation will show its full advantages here. One way of getting the water to the roots of plants without wetting the tops and much of the surface, is illustrated in the accompanying diagram. The number of pots and location between

the plants is shown at Fig. 1. With plants standing seven or eight inches apart each way, and a pot sunk into the ground in the center between each four plants, a few dozen pots will go a great way. Pots four inches across the top are just about right for the purpose, although there is nothing arbitrary about the size. Fig. 2 represents a cross section of bench. The liquid, whether it be clear water, washing suds or weak manure water, is simply turned into the pots and the applications are repeated until

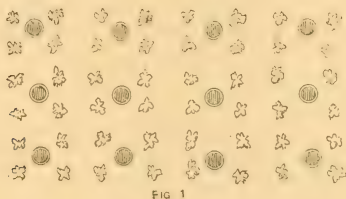


FIG 1

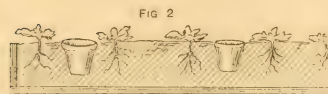


FIG 2

LETTUCE BED ARRANGED FOR SUB-IRRIGATION.

the liquid ceases to soak away rapidly, or until ordinary good judgment tells us that there is enough. In clear weather and loose soil, lettuce will stand and delight in a great deal of moisture. Our aim, of course, is to force the crop along as rapidly as possible, and thus to produce a brittle, succulent growth and fine heads, which will delight the consumer and make him ask for more. Little is to be said about cultivation, simply because little can be

done. A little stirring of the soil about the plants, with the finger or some suitable tool, during the first two weeks after the plants are set out, is about all that is required, for the plants soon occupy the whole ground, and if proper attention is paid to watering and ventilation, our duty is done.

What is the best variety for forcing purposes? This question I am unable to answer definitely. The variety you want is the one which your consumers or your available markets want. Grand Rapids is popular and almost the only variety grown in some localities. It makes a strong plant and a great mass of beautifully curled leaves, just right for garnishing. It is just the variety for the hotel trade. A few leaves spread around the edges of meat plates and partially under the meat, give the dish a most appetizing appearance. The plant has a remarkably healthy and upright growth, and is less subject to mildews and rots than the close-heading sorts.

Grocers and other retailers usually prefer head lettuces. The variety almost universally grown for this trade, and a good one, too, is Boston Market or some other good strain of the Tennis Ball. It is of good size and makes fairly good heads. The newer Big Boston is much larger, but takes a longer time to come to maturity, and always has a somewhat coarse appearance.

Among all the varieties now listed, I know of none better than Buist's Perfection White Forcing or Landreth's Hot House lettuce. There are more thrifty growers among lettuces, but I have seen none that head up more promptly, are more attractive in

appearance, or more brittle and tender. The grower will have to study the seed catalogues and the columns of horticultural papers, etc., and, while growing the once-tested and known-to-be-good varieties for main crop, try also the new ones that come well recommended and endorsed, on a small scale at first.

Under fairly favorable conditions a crop of lettuce can be grown under glass in from five to six weeks' time. We always try to hurry up the crop and get it into market as soon as possible in order to start a new crop. In mostly clear weather I can produce good heads in four weeks, provided I have the plants to do it with. Usually I prick out plants from the seed-box or seed-flat into flats, about two inches apart each way, and cut them out with nice chunks of soil, and set them into the bench at the proper time. One can transplant quite large plants in this way, and thus produce a crop in the minimum of time.

In order to make the most of our opportunities, we must crop closely—*i. e.*, raise crop after crop in rapid succession. I always aim to have a supply of large plants, in flats or otherwise, ready to go out on the bench just as soon as a spot is cleared from a preceding crop. If I take out a few dozen lettuce in the morning, the space will be occupied by another lot of thrifty plants before night, and in four or five weeks another crop will be ready. No use letting the beds be idle for a day.

Another plan which I find useful is here illustrated. Sometimes, when the bed is not irrigated by means of flower pots, as before described, and large plants are not at hand, I set ordinary plants

just half the usual distance apart, namely, $3\frac{1}{2}$ or 4 inches each way, instead of 7 or 8 inches. In a week or ten days afterwards, I can take up every other plant in the rows, alternately, the dotted circle in illustration indicating the plants to be removed.



If carefully taken up with a trowel, these plants can be re-set into a bench just cleared from a crop, in same way as I advised to set the large plants from flats. The plants remaining now appear as shown in center of diagram. Here they have room enough to grow for another week, and every alternate row may then be taken up and also transplanted, or allowed to stand until the plants crowd closely, and then cut out for use or sale, leaving the remaining ones at proper distance for full development, as shown at the right of diagram.

While the greenhouse is furnishing a continuous supply, and portion after portion of the benches mature their successive crops, we must always aim to have an especially liberal amount at such times as Thanksgiving, Christmas, New Year, Washington's birthday, Easter, and for other special occasions. By the time that any considerable part of the greenhouse space will be needed for raising tomato and similar plants, four crops of lettuce (or radishes) can be grown and disposed of. Let us see what is the

value of one crop that can be grown in a house as small as mine (20 x 16). I have about 225 square feet of bench space. This will accommodate about 880 plants, set 7 x 7 inches. Allowing a fair percentage for culls, we will have 60 dozen of marketable heads, worth usually 50 cents a dozen, or \$30 for the whole crop. The three or four successive winter crops should bring us not less than \$100, which seems pretty good pay for the little labor and expense of raising them at a time when no other work is calling for your time and attention.

Lettuce, like other crops, has its enemies, and sometimes extra efforts are necessary to save it from injury or ruin. Among insects, the green fly is the

Lettuce Enemies.

most troublesome to the lettuce growers, as it seems to be especially partial to the lettuce plant. Fumigation with tobacco will keep it in check. A pound of tobacco stems, or half that quantity of tobacco dust, thrown on a shovelful of live coals in a kettle, will fill a house like mine, when tightly closed, with a dense cloud of smoke and kill most of the insects in it. This should be repeated about once a week, and the treatment, if persisted in, will soon rid the house entirely of the pest. The same object may be accomplished by keeping gutters filled with strong tobacco tea on the heating pipes. Such gutters are kept in stock by dealers in florist's supplies, or they may be made to order by the nearest tinsmith. I can get rid of green fly in the simplest manner by sprinkling tobacco dust freely on plants and soil. Its use on the plants must be dispensed with, however, when the plants are nearing market size, and

mulching around them with tobacco dust or broken stems can be depended upon to keep the insects in check until the crop is taken off.

Snails sometimes become troublesome on lettuce under glass. Spraying with lime or salt water, or with a weak solution of muriate of potash, after dusk, or mulching lightly with wood ashes, will speedily end their earthly career. More serious than these insect enemies, however, are various kinds of lettuce diseases. Foremost among them, and usually most destructive, is the lettuce mildew, a delicate mildew, attacking the leaves and causing yellow or brown spots, and finally killing the leaf. Keeping the temperature low, say 35 to 40 degrees Fahrenheit at night, and 50 to 70 degrees during the day, and the foliage and soil surface entirely dry, applying water freely but through underground pipes or sunken flower pots only, are the easiest and simplest means of keeping this disease off. If water has to be applied from overhead, it should be done in the morning and on bright days only. If the disease is found on plants, it should be promptly fought by means of sulphur fumes. Put a deep iron kettle containing a quantity of brimstone, on a little oil stove in the closed greenhouse, and let the sulphur boil until there is a perceptible sulphur smell in the house. Be sure that the flame will not come in contact with the sulphur and set it on fire. The kettle should be deep, so that the sulphur cannot run over, for if the sulphur should become ignited, the plants will be killed.

There is more or less decay of the lower leaves by wetrot in plants watered from overhead, or by simple

withering and drying up, which is less noticeable on sub-irrigated ones. Sometimes a kind of black rot attacks the hearts. Sub-irrigation will be most likely to prevent the trouble. Affected plants might be sprayed with a solution of permanganate of potash, or possibly a very weak one of sulphate of copper (one ounce to seven gallons of water.) A still better way is to remove and destroy the affected plant and set another healthy one in its place. The four lettuce crops, and perhaps successive crops of cucumbers, etc., can be grown without changing the soil, or without adding fertilizing materials of any kind except what is given in washing suds or other liquid applications. Give the surface a good working over, by hand or with a trowel or other implement, and the bed will be ready for setting out another lot of plants.

Lettuce is the great and chief crop, easily grown, easily sold and always profitable. But it is always well to have a variety. A certain proportion of radishes may be mixed in; they often come handy and find a good sale at remunerative prices. True

Other
Winter Crops.

to our motto of close cropping we may sow seeds in flats rather thickly and then prick the seedlings out on the benches in rows three inches apart and plants one-half inch apart in the rows. Or we may sow seed directly into the benches in rows three inches apart. Of course we must select some quick-growing variety. The turnip-rooted sorts are almost exclusively grown for this purpose. Many growers and markets prefer French Breakfast to all others. I like the Earliest Forcing, Rosy Gem, Rapid Forc-

ing, Fireball, or by whatever name you may get these round radishes of quick growth. The long-rooted ones require longer time, but must be grown in case the market demands them. Then use Long Scarlet or Wood's Early Frame. Of course for long radishes there should be a good depth of bench soil. Keep the soil well supplied with moisture and stir the surface frequently with the finger or a long-handled iron spoon or similar tool. When the radishes are of proper size they should be pulled and bunched, say six to eight in a bunch. They ought to bring not less than five cents for two bunches at any time. You will need a little corner of parsley for soup greens and garnishing. These bunches of greens are always in demand. If you have some small plants in the fall, set them out on a deep bench or under the bench, say three inches apart each way, and give them plenty of moisture. Cut the tops freely as needed. It may be well to start some plants from seed in mid-summer for this very purpose. Cresses will also come handy to go with the lettuce. The ordinary pepper-grass is of quick growth and must be sown repeatedly. Any vacant spot under the benches will do well enough for this crop. Water cresses might be grown in tubs or a water-tight bench or tank, but are not produced so surely and easily as the other.

I have never been able to make forced onions pay. The money in onions is in a big crop of big bulbs from transplanted Prizetaker seedlings in open field. Possibly we might grow the Egyptian tree or winter onion under the benches and make it profitable. It is worth the trial. Just plant large bulbs out in

well-prepared soil under the benches as you would in open ground, and pull the stalks as wanted for bunching. Prof. W. J. Green, of the Ohio Experiment Station, sometimes uses Barletta plants grown from seed in summer, and plants them out on the benches; they bulb up in a very short time, and although the bulbs are quite small, he finds they sell well at a time when other bunch onions are not found in the markets.

Rhubarb and asparagus may also be grown under the benches during the latter half of winter. Of course, good plants are needed, and they should have some rest before they are started up in the greenhouse. The best way is to grow plants from seed, set them so as to stand at least a foot apart in rich soil, letting them get age and size, and then take up after the first frost in the fall, and heel them in a cool, dark place (cellar or trench) where they can be got at when wanted. Along in January or February take up the roots and plant them out under the benches, watering freely. The stalks are bunched in the usual fashion, only in smaller bunches, and often bring a good price.

Another crop that can be grown under the benches are mushrooms. The ordinary mushroom, *Agaricus compestris*, is always in demand, and always a paying crop when you can succeed in growing it. And with empty space under the benches, and an average temperature of from 50 to 70 degrees in these places, I see no reason why they could not be grown. The time for growing this crop extends from September (or even August) until March and after. What you

Mushrooms
Under Benches.

must have is fresh horse manure, preferably from hard-worked, grain-fed horses. Gather it from day to day from the stables, shake out all the coarsest parts, especially dry straw and litter, and place the droppings and all fine stuff, sweepings, etc., under cover. You may also mix in the droppings collected from your nearest blacksmith shop, and perhaps some spent hops, if you can get it freshly from a near brewery. Then mix about one barrow load of fresh loam taken from an old pasture, with every three loads of the manure, etc., and shovel the whole over every second or third day for two weeks. You will then have a homogeneous mass, without much smell, and ready to be made up into beds. As fast as the manure is collected and prepared it is placed under the benches, section after section of the space being thus made up. Along the front I usually place cheap boards, 8 or 10 inches'wide. They can simply be set inside of the supports, or fastened to the supports (scantlings) with screws. The manure is filled in behind them in layers, every layer firmly beaten down with a brick, a tile, or a piece of 4 x 4 timber a foot long. Fill the bed up clear to the top of the board or a little above it, except just at the front, and have it nearly on a level. Now watch the bed for a day or two. It may heat up more than is desirable. Wait until the temperature inside the manure (to be tested from time to time with a correct thermometer, a bottom heat thermometer being most convenient) has subsided, and is going down below 90 degrees. Then the spawn may be inserted. Be sure to get brick spawn that is freshly imported. Much stale stuff has always been put on the market,

and failures from this cause have been plenty. Break each brick into about ten or twelve pieces and place the pieces, one in a place, into holes into the manure, made by hand or with a trowel, about three inches deep and ten to twelve inches apart each way. Thus the spawn will lie about an inch below the surface. Cover it with manure, lightly pressed down and level the surface. An inch of loose straw or hay may then be placed on top and the bed left to itself for a week or ten days. Then remove the covering and put on an inch or two of loam, press down lightly and again cover with the litter. Little else can be done except sprinkling the bed, should it become dry, very lightly with tepid water. During the bearing period, which should begin in not more than eight weeks, the water applied may contain a small quantity of nitrate of soda, say an ounce to the gallon. The mushrooms have to be gathered daily. In pulling (rather twisting) the mushrooms, great care is necessary to do as little damage as possible to the small specimens not yet developed fully enough for harvest. The holes left where the specimens were taken out should be filled with a little fine loam kept in reserve for this very purpose. The loam adhering to the lower end of stem must be peeled off with a knife and the specimens can then be put in small baskets and placed on the market. When the crop begins to fail by exhaustion of the bed, it can be made to give another, though lighter yield, by covering the bed with an inch of fresh loam and giving more sprinklings with nitrate of soda water. The watering should in no case be allowed to reach below the

surface layer of loam and into the manure itself. This would be fatal to your hopes and the crop. If you have a spray pump, this is the best implement with which to apply the water. The whole inside of the house may be freely sprayed with water in order to keep the atmosphere moist and cool, especially during early fall and late in spring.

The new mushroom, *Agaricus subrufescens*, may be grown both on and under the benches during the warmer part of the season. It is a regular "hot weather" mushroom, and of very robust growth, requiring, and being able to endure, quite liberal applications of water, in fact enough of it to amount almost to a soaking of the bed. The markets, however, do not as yet take as kindly to the new mushroom as they do the ordinary *Agaricus compestris*.

CHAPTER V.

PLANTS FOR SPRING SETTING.

THERE are very few garden crops in the management of which it is not a point of greatest importance to be "first in market," for with the great majority to be first in market means first to sell and first in price. But in order to be first in market we must be first to sow. Good onions are usually as good a crop to sell as any other, especially if you offer to onion lovers those large, perfect specimens of Prizetaker along in August when there are none but poor, Southern-grown potato onions to come in competition with them. So I am usually more in a hurry about sowing onions than any other kind of plants for Spring setting. Indeed, when seed is sown in February, so that you can have good plants to set as early in Spring as the ground is in working order, you insure a paying crop against almost any whim of the season. Even if reduced one-half or more by drought or mildew, the yield will be equal to what most onion growers would call a good one, and the individual bulbs will still excel in beauty and selling value. We also want a good supply of early beet plants. Next come cauliflower and early cabbage, perhaps lettuce, and the plants should be large enough to go in cold

frames, for hardening off, in March, and be ready to set out in open ground just as soon as the season will permit.

The great enemy to all seedling plants is the disease known as "damping off," which is caused by a **Plants Damp-
ing Off.** fungus and often destroys whole beds and flats of seedlings. We have sometimes lost a great proportion of our onion seedlings from just this cause. Prof. T. B. Galloway gives the following account of it: "Its first appearance is indicated by a slight paleness and drooping of the seedlings. If these be carefully removed, it will be seen that the root, either throughout its length or in portions, is beginning to shrink and decay and that the root hairs are destroyed. Later, if the plant is not vigorous enough to resist the fungus and to put forth secondary roots, the disorganization of the tissue extends to the stem, resulting ultimately in the toppling over of the plant and its thorough decay, although, in some instances, the plant remains green for some days after falling. This extends from one plant to another, until only a few or none of the seedlings in a bed may be left."

Recent investigations seem to disclose the fact that the fungus gains entrance to the plants through the roots, and suggest, as proper means of prevention, the use of soil that is free from the fungus, or a treatment of the soil used with a view of killing the fungus germs if present in it. It may be placed in the warm and close atmosphere of the greenhouse for a while, and kept well watered until the fungus spores have supposedly begun to sprout, when it (the soil) should be exposed to a very hot and dry

atmosphere for a while, so as to kill the tender fungus growth. Possibly watering soil with a solution of copper sulphate, a pound to two hundred gallons of water, may also free it from infection. Usually, if excessively high temperature (considering the nature of the plants) and close, moist atmosphere are avoided, and attention is paid to proper airing, the disease will give little trouble. The best precaution, however, is the use of new soil, made from old decayed sods, perhaps with the addition of a quarter, more or less, of clean, clear sand. Last winter I frequently and freely watered the soil, and sprayed the plants, with water colored a deep violet by permanganate of potash, and thus apparently kept the plants free from the attacks of the fungus. Often the trouble is only wilting from an insufficient amount of moisture at the roots, water thoroughly when at all.

I have tried a number of varieties, but find that the Prizetaker outyields and outsells all others.

Growing There are some fine white sorts, among
Onion Plants. them White Prizetaker, and White Victoria, the latter at least when you have the right kind of seed. But white onions, while in good demand as early bunch onions, do not seem to find sale when dry, in competition with yellow kinds. Possibly there may be demand for them in some markets, but in our vicinity we can sell a load of Prizetakers about as quickly as we can find sale for a single bushel of white onions, no matter how fine they may be.

The plants might be grown directly in beds on the benches, but I prefer to use flats. These are

boxes of any size desired and three or four inches deep. The boxes in which local grocerymen receive their canned fish and meats, such as lobsters, salmon, beef, etc., and which are about 19 inches long, 10 or 11 inches wide, and 4 inches deep, are just about right, and quite handy, and may be picked up at the grocery stores in villages and small towns during the Winter. I usually get a full supply in this way. They can be used a number of years if care is taken of them.

My way, and a very successful one of starting the plants, and growing the largest possible number in the smallest possible space, is as follows: The flats are filled nearly full with the prepared soil. I then put them upon the ground, and press the soil down tightly in each flat with the foot. Next I give a thorough watering, enough indeed to soak the soil pretty full. This is intended to furnish the supply of moisture needed during the next week or two. More soil is put upon the soaked layer, and pressed down with the hand or a small box, such as an empty cigar box. The seed is then sown evenly over the soil, at about the rate of one-tenth to one-eighth ounce to the square foot, and covered with a half or three-quarter inch of sand or soil, preferably the former. Another firming (with the box or piece of board) completes the operation. The flats are set closely together on the benches, and watered as may be necessary. Whoever has a water-bench may give the required soaking from the bottom. There should be some cracks or openings left through which the water may gain admittance from below, and the flat is placed upon cleats or other

small articles to be slightly held above the bottom of the water-bench, standing in an inch or so of water. When the soil in the flat is well saturated, the latter is taken out of the water-bench and placed upon the ordinary bench. In about ten days the plants should gradually make their appearance above ground. The flats will need an occasional watering (sometimes perhaps with liquid manure), and airing in clear weather, that is gradually increased as the season advances. Onion plants are hardy, and will not require high heat at any time, from 45 to 55 degrees Fahrenheit being about right at night, and 60 to 70 degrees during the day. In clear days, later in the season, the temperature will naturally go up higher. The crop of seedlings will not require much care. Should weeds start up among the onion plants, they may be pulled up by hand, and if the plants grow up very tall, they may be clipped or shorn back once or twice as needed to make them stocky. I like to have them about as large as a goose-quill when ready to be planted out, but have to set them frequently much smaller. The first sowings I make about February 1st, and successive ones along in the same month, finishing off before March. If I do not have bench space enough, I make a hot-bed with moderate bottom heat, and sow seed broadcast in same way and at same rate as in the flats. A flat of size named (19x11 inches) should give 600 good plants, possibly more. You can easily make your own calculations as to the number of flats, or the bed space required to give you the plants needed for the desired area. Be sure to make liberal allowance for failures in

raising seedlings. In other words be sure to start plants enough.

Lettuce, cabbage and cauliflower plants may be started right on the benches during February. You want them to go out in cold frame in March; for on

**Cabbage and
Cauliflower Plants.**

the thorough hardening of the plants before being taken to open ground, depends much of the success in producing the early crops that pay best. It takes but a little bench space to start quite a number. Of course, early cabbage usually finds ready sale, and often proves to be one of the most profitable crops of the market gardener. This is especially the case where the crop is sold to a local retail trade.

My way to start the plants is to make a few shallow furrows, an inch or so apart, across the bench, with the finger or with a stick, and then sow the seed in them rather thickly, cover by rubbing across these rows with the fingers, thus covering the seed and leveling the ground, and firm with a piece of board, or a cigar or other small box. The plants will soon come up and need little attention, for as soon as they have made the first pair of true leaves, being then about two inches high, they are ready to go out into cold frames. The soil in the latter, of course, should be of the kind especially prepared for plants and made of rotted sods, loam, etc., but with only small additions of old manure. Mark out rows about three inches apart, and set the plants freshly taken up from the bench, one to two inches apart in the rows, pressing the soil tightly about the roots. An ordinary hot-bed sash should cover

from 500 to 600 plants. Water well after setting the plants and then put on the sashes, leaving them on tightly in dark or cold weather, and giving air by tilting or in other ways, on all clear days and in warm weather. The amount of ventilation is to be gauged by the weather conditions, and you will have to use your own judgment to quite a considerable extent.

I always like to give to the plants which I raise for my own planting, a good deal of room, for I like to have good plants with plenty of roots, and to take them up with some soil adhering to the roots, in order to give them the best possible chance for a quick start after transplanting. Quite generally, however, the market gardener who is known to raise and have good stocky plants, will have considerable call for them. Early transplanted cabbage plants usually bring \$3 to \$4 a thousand, and they pay well at that, especially if one crowds them a little closer together in the frames than I would advise to set them for one's own plants. An inch space between the plants in the rows will be sufficient. The number of plants grown under one ordinary sash (3 x 6 feet) may thus be increased to fully 800. At the prices named, it will be seen that a crop of cabbage plants is quite remunerative, especially in consideration of the short time required for its production, and of the fact that another crop can yet be grown in the same frame the same season. By all means grow all the early cabbage plants that you are sure you will need, or can find sale for. The variety—and perhaps the only one—which we want for this purpose is early Jersey Wakefield.

Our aim, of course, is to have strong, stocky, well-rooted plants ready to go in open ground just as soon as the soil is in right condition in spring. All that I have said about cabbage plants, applies also to cauliflower, and in a measure to lettuce plants. Of cauliflower varieties, I would select Early Erfurt and Snowball (which is a strain of the former), although there are various other strains of this type (Maule's Prize Earliest, etc.) which have given me fine heads and great satisfaction. Cauliflower seed is always expensive, and we have to be economical in its use. We should try to make every seed count, and therefore must not sow so thickly that thinning and consequent waste of plants becomes necessary. Nor should we sow more seed or try to raise more plants than we are sure will be needed for setting or sale. The crop must be started and grown early in order to be out of the blasting influence of excessive summer heat. Usually the local demand for early cauliflower is limited, and in many places it will be easy to overstock the market. Among lettuces suitable for starting under glass and setting in open ground at the earliest possible date in spring, market gardeners usually grow Tennis Ball, and especially the Boston Market, which is a selected strain of the former. The varieties which I have recommended for forcing where a heading lettuce is preferred to the beautiful but loose-leaved Grand Rapids, are the ones I prefer for this purpose also.

Early celery is an important crop, and usually pays well, especially when the grower sells his vegetables direct to retail buyers. White Plume

is the variety ordinarily grown for this purpose, although Golden Self-Blanching is also a fine and suitable sort. The new Pink Plume

Celery Plants.

is suitable for the purposes of the home grower mostly. It is not difficult to grow the plants. We want them ready for setting in open ground during May, and seed should be sown along in February. If this is done much before the middle of February the plants are liable to "bolt," *i. e.*, go to seed rather than make a good salable plant. The first step is to fill flats with a well-prepared fertile loam. It should be well pressed down, and then come to within a half-inch of the top of boxes or flats. It is then given a good watering, a little more fine soil sprinkled on the surface, and the latter made smooth, even, and firm, by means of the firming board, or the small box already spoken of. Then seed is sown thickly enough that you can expect to get a thousand seedlings, or thereabouts, to the square foot. Cover the seed lightly by sprinkling or sifting a little fine loam or sand over it, and again firming. Water as needed, either by overhead sprinkling (better spraying with a Knapsack sprayer, as I do) or by setting in the water bench. In ten days, more or less, the young seedlings will come up, and by the middle or end of March they should be large enough for transplanting into the cold frames. This "dibbling out" into frames is rather delicate work, on account of the small size of the plants, but with a little practice it can be done quickly. The soil in the frames should be of same character as that recommended for cabbage and other plants, *viz.*, a fibrous loam of

medium fertility; but it may be made a trifle richer than for these. I usually mark out rows lightly, two inches apart across the frame, and try to set the plants an inch or less apart in the rows. This will give 1,200 plants or so to the ordinary hot-bed sash. The plants, when well grown, are usually in good demand, and sell at 50 cents per 100, or \$4.00 per 1,000. It will be seen that the crop, at these rates, is a paying one, and the young gardener should always try to raise as many as he will need and as he is sure he can sell at the prices named. Of course, the frames containing plants, whether they be cabbage, cauliflower, onion, lettuce or celery plants, will need occasional watering, weeding, and, perhaps stirring the soil about the plants, and thorough attention to ventilation. My favorite way to give air to them in the ordinary weather (clear, but raw) of early spring, is to move the sashes slightly sidewise or cornerwise: This is more easily done than tilting the sashes, and gives just about the right amount of ventilation at the corners of each frame section. We also want a good supply of good

Beet Plants.

beet plants of the Eclipse or Early Egyptian type, for setting in open ground as early as possible. Seed should be sown in rows on the greenhouse bench, say three inches apart, and plants left to stand one-half inch or so apart. The plants are easily grown, and easily transplanted.

The use which we intend to make of our tomato plants must decide the manner of starting and managing them. Indeed we may deem it advisable to treat different lots in radically different ways.

Our chief aim, probably, will be to grow tomatoes for the market. In that case, we must try to get

**Tomato Plants for
Own Use.**

them before appreciative customers as early as possible. The prices usually obtainable in July and August are quite acceptable, often comparatively high. Sometimes, indeed, the gardener who has nice tomatoes, a little ahead of the rush, can ask his own prices for them, and secure several dollars per bushel, especially if selling in small lots to a good class of customers. It will pay well to take some extra pains with a number of tomato plants for the purpose of securing an early supply. In the first place comes the proper selection of variety. There is a great deal of difference between varieties in this respect. For a while we had the King of the Earlies, a weak grower, producing a fairly large number of very early, but rather irregular tomatoes, of third or fourth quality. Its earliness really was its only virtue, and we gladly gave it up for the Early Ruby, which is not only still earlier than King of the Earlies, but also a better grower, and a better yielder of fair-sized, fairly smooth tomatoes, of second quality. Still earlier is the newly introduced Early Leader, which ripens a whole cluster of medium-sized fairly smooth tomatoes, far in advance of any other variety I know of.

In short, for earliest market and most profit, we must have a variety surely not inferior to the Ruby, and of this we must start plants quite early. I sow seed about middle of February, thickly, in flats, and when the seedlings are making the first pair of true leaves, I prick them out on the greenhouse bench,

say three inches apart each way, and let them grow until the tops begin to crowd.

Then I give them more space, or at least cut or shear the tops off. This will keep them low, and force the laterals out, making the plants short and stocky. It is absolutely necessary that the plants should have plenty room for full development at all times. They must never be allowed to crowd one upon another. For the last shift I put them in the large-sized plant boxes, which one can now buy in the flat at about \$2.50 per 1,000 from Michigan manufacturers. The soil should not be excessively rich, nor the temperature excessively high, nor water be given in excessive quantities. We want a strong, hardy, stocky growth. Just before the time that we think is proper for planting them in open ground, we should try to harden these plants off properly by placing them for a few days and nights in a frame in some well protected spot out of doors, leaving without cover even during the nights unless the weather is cold, when some slight protection by sash, shutters, or blankets may be given. Thus treated, the plants can be risked in a warm, somewhat protected spot out-doors quite early in the spring, and will stand even a slight frost unharmed. It is always a safe precaution, however, to hold some plants in reserve, and surely have a second, later lot on hand, which can be drawn upon should a mishap befall the earliest planted ones. My earliest plants are always in bloom, and with fruit set, when planted out.

For the main crop, which goes to supply our regular retail customers during the entire season, we

want a really good, fairly large, solid and smooth tomato of the color that the consumers may prefer. In most markets we can do better with a red tomato than with a pink or purplish one. The Matchless is as yet nearly matchless, and the Ignotum is known well for a good and reliable sort. We can easily fare worse when taking others. But there are now a great many good tomatoes in general cultivation, and good new ones are being constantly introduced. Stone and Nickel Plate (a red Potato Leaf) are also good red sorts, while the newer "Imperial" will be hard to beat among purplish ones. There is no particular need of setting plants of any of these varieties in open ground before all danger of spring frosts is passed, here usually the very last of May. My practice is to begin planting with small lots of plants, soon after May 20th, and finish by June 1st. Usually the plants will grow better, while the weather is still cool in early May, if they are left with some protection and having proper space, than if risked out in open ground too soon.

Middle of March, here, is early enough to start the seed. The seedlings are handled in about the same fashion as already described for the earliest tomatoes, but the final shift, late in April, brings them into cold frames, where they can be properly protected during cold and raw weather, and also properly hardened by exposure during warmer weather. I prefer a rather stiff or fibrous loam, which will firmly adhere to the roots without crumbling when the plants are cut out of the frames in square chunks, with a spade, for their final transfer to open ground. Now I grow most of my

plants in the plant boxes already mentioned, but of the four and one-half cube size. They can be handled more conveniently, set out in frames to harden, and taken to the field on a wheelbarrow or wagon without having the soil jarred off the roots. The great need of these plants for plenty of room can hardly be pointed out too strongly. Four inches square is the very least I want for plants of my own setting. Crowding makes long and spindling things, and such we do not want.

If we want plants for the wholesale production of tomatoes as, for instance, to sell to canning establishments at a low price, we must grow them on a still different plan. We want a good many plants, and must grow them cheaply. Indeed, we can hardly afford to devote much time and space to them. We may sow seed in flats early in April, and prick out the seedlings in cold frames or a mild hot-bed by the last of the same month, or early in May, setting them, say, three inches apart each way. The final transplanting to open ground can be done about June 1st, or as soon as all danger from late frosts is past. We don't want to run any risk of losing the plants, especially since we know them to be more easily hurt by frost than the plants started earlier and grown with more space between them, and therefore more stocky and more hardy.

Growing tomato plants for sale used to be quite a lucrative business. Now plants are usually offered so abundantly and so cheaply in the open markets, by grocery and other stores, that it is often a question whether this branch of the business still pays.

At any rate we have to be guided in it by the kind of demand we have for plants. If we have customers willing to pay a good price for good plants, say 25 cents per dozen, we can afford to produce them, and we will most likely grow them in flats, a dozen in a flat of 12x15 inches, or thereabouts, and manage them in the general way as we have managed our plants for main crop. We must understand that these plants make the most of their growth, and need the most space, mostly during the month of May, when the greenhouse benches have been gradually vacated by the removal of onion, cabbage, cauliflower and lettuce plants, and would stand empty save for such crops as tomato and similar plants. It needs very little fire at this time, and consequently the tomato plants can be grown without much expense or trouble.

But the majority of plant buyers look very little upon the quality of the plants. Cheapness is their first, and often their only consideration. They want a dozen plants in a box for ten cents, or a hundred pulled up from the cold frame for forty or fifty cents. Consequently we have to grow these plants in the cheapest way possible, and cannot afford to give much space to each individual plant. The "flats" to be used in this trade are little bits of boxes, say 4 or 5 by 6 or 7 inches or so, containing a dozen or fifteen plants to be sold at ten or fifteen cents per box. Of course we must not start the seedlings too early, say not earlier than April, as they would be liable to become overgrown and spindling. The soil should be only moderately rich.

The cold frames also have become partially empty, as onions, cabbage, cauliflower, and lettuce plants have been taken out to the open ground. It will be better to utilize the space in the production of a late crop of tomato plants, even if they have to be sold cheap, than to let them stand idle for the rest of the season. It does not require much space in greenhouse or hotbed to start a thousand tomato seedlings. Along in April or even in May, the seedlings may be put out into the frames in rows three inches apart one way, by about one and a half or two inches the other, thus crowding 400 to 500 plants under one ordinary hotbed sash. The crop, when sold brings \$2.00, more or less, additional revenue from each sash. I have known New Jersey gardeners to grow two successive crops of tomato plants in their frames, the last crop being sold to people who plant extremely late for canning factory, or who have lost their first plantings by late frost, by grubs, bugs or other causes, and find it necessary to replant. Of course the late crop of plants is usually sold at still lower figures, often at only one dollar per thousand. But it brings some money at trifling expense.

Sometimes I find it convenient and profitable to make use of cuttings for propagation, as for instance when I have only a few seeds of an especially choice variety, or when I find I have neglected to start a lot of seedlings in time, and want to catch up again. I can make a new plant much quicker by rooting a cutting than by sowing seed. Tomato cuttings root quite readily. If the soil is warm roots will

**Plants and
Cuttings.**

form on the cutting within a week's time, when the cutting can be taken up and potted or boxed off. After the plants have their full size in the field, you will be unable to tell which was grown from a cutting and which from a seed. You can take the top or any of the side shoots and root it for a new plant. Cut the lower end slantingly with a sharp knife, and cut the larger leaves back to within an inch or two from the stem. Then insert the cutting in a bed of clean sand on the bench, keeping the sand quite moist. When you notice the beginning of new growth the cutting is ready to be taken up and planted out in frame or flat.

I find egg plants about as easy a crop to raise as almost any other, and to the limited extent of the retail trade, one of the most profitable. All we have to do is to grow good plants, and set them in rich, warm ground, about June 1st, and we can rely on growing not less than from three to six good sized eggs, some of them eight inches long and six inches in diameter per plant. They have usually sold from five to fifteen cents apiece, and a season's returns from one plant may foot up 50 cents. At the same time we usually plant close, namely, in rows not over three, sometimes only two feet apart, with about 18 inches space between the plants in the row. If we only had sale enough at retail rates, we would gladly plant this crop by the acre. The surplus, however, can be barreled and sent to the commission men in the nearest big city, or sold to the grocers nearer by. They will pay as well as tomatoes any way, and usually much better. I use

Starting
Egg Plants.

an improved strain of the New York Purple. In colder locations, earlier and smaller varieties, such as the Early Long Purple, or any of the Japanese importations, will be found preferable, as the New York Purple may refuse to set fruit. The more dwarfish varieties seem to be hardier and yield a large number, up to ten or a dozen of eggs.

Sow seed in flats, using rather richer soil than for tomatoes, and stand the flats in the warmest part of the house. Tomato plants may be grown in about 65 degrees to 75 degrees Fahrenheit during the day (of course up to 90 degrees during sun-shiny weather), and 55 degrees to 65 degrees during the night. Egg plant will stand five degrees to ten degrees more. When the seedlings are about two inches high (having the first pair of true leaves) they may be pricked out into flats or on the greenhouse bench, and handled in the same general fashion as tomato plants. They can stand a little closer than tomato plants, however, without suffering. Shift as needed, always using rich soil; finally plant them in pots or flats, in soil that will stick well to the roots, so they will keep on growing right along when planted out in open ground June 1st. If you have plants for sale you may ask about double rate that you get for tomato plants, but the demand is quite limited.

Green and red peppers are usually in good demand late in the fall. It does not require a long season to grow them, and as there is

**Starting
Pepper Plants.**

no premium on earliness, plants may be started and planted out rather late.

Any time in April, or, perhaps, the first of May, is time enough to sow seed, if, afterwards, you push

the plants right along. They will not need much space either. I usually plant Ruby King, red, and Golden Upright, yellow. Plants may be sold at the same rate as tomato plants. You can have them in flats, or grow them directly on the greenhouse benches, or in hot-beds and cold-frames. When one has sale for plants of any kind, the aim must be to keep the greenhouse and frames full all the time until the end of the plant growing season. Every little helps, and even if there is no fortune in plant growing, it will give some revenue, and in the aggregate prove profitable. In some localities it may be advisable to devote some greenhouse space to the propagation of pansies, verbenas, perhaps primroses and other flowers. Pansies are easily grown from seed, which should be sown in January or February. The young plants are to be pricked out in cold frames in March or April, or seed may be sown in August in open ground, and the plants wintered over in cold frames. Verbenas are usually propagated from cuttings, but may also be grown from seed. Of course this is a side issue, to which I can do little more than simply call the attention of the reader.

When the greenhouse benches begin to be vacated in April or early May, and no late crop of plants is

**Forcing Cucumbers
and Tomatoes.**

to occupy them, the space may be used for forcing a crop of cucumbers or tomatoes, or both, to be ready for use or sale some weeks in advance of the earliest outdoor crop. Cucumbers are not difficult to raise in a greenhouse. I select Forcing White Spine, and plant the seed right into the

benches in a row along the centre of bed, three or four seeds in a place, about a foot apart. Only one good plant is to be left. I stretch wires across the bench, and from these strings or other wires perpendicularly up to hooks inserted into the rafters overhead. The vines are trained up on the wires, and also on wires stretched along under the roof. To insure fruit setting, a small camel's hair brush should be frequently dipped into the male (staminate) flowers, loaded with pollen, and then slightly brushed or dusted over the pistils of the female (fruit) flowers. The pistils thus touched will grow and produce fruit; those not so treated will most likely wither away. Early greenhouse cucumbers usually find ready sale at acceptable prices, and I think, as a rule, they prove more satisfactory, less troublesome and far more profitable than greenhouse tomatoes.

In order to grow the latter at this time, it is necessary to start the plants from seed or cuttings not later than January, shift often into larger and larger pots or boxes, always allowing plenty of room, and finally put them each into a box containing about a cubic foot of soil, or into a deep bench bed. The best variety for this purpose, I think, is the *Lorillard*. The plants are trained up on upright wires or strings. We allow three branches to the plant, and remove all others. They must be tied promptly as needed. The first blossoms may fail to set fruit for want of pollen. Growers may find it profitable to gather a lot of tomato flowers in late Summer, dry them, and save the pollen for use on the tomato flowers in early Spring. It will insure

the desired fruit setting. A little later, when the sun gets higher, and brings heat and dryness, pollen will be developed and matured in sufficient quantity to pollinate the pistils, and fruit will set. The first fruit, if not properly pollinated, sometimes remains small and seedless. From June on nothing more is to be grown in the greenhouse until Fall. As opportunity offers, it may be cleaned out, all soil removed, and the house thoroughly fumigated by burning a quantity of brimstone in it while tightly closed. Then toward Fall the empty benches will be a capital place for curing pickling and other onions, and when they are out again, new soil may be put in for a renewal of activities.

CHAPTER VI.

HOT-BEDS AND COLD-FRAMES.

LITTLE need be said about the construction of hot-beds and cold frames. They consist of simple plank frames, say six feet wide (or of proper width to accommodate the length of the sashes), with a four or six inch incline towards the noon sun, and as long as required for the number of sashes. To make hot-beds of them we set them upon a layer of heating manure while for simple cold frames we place them upon the surface of the ground, in both cases of course in a well protected spot, and somewhere near the greenhouse and the water supply. When we have the use of a greenhouse we seldom need hot-beds, and at any rate we will not find it necessary to start them very early. A manure hot-bed is often a vexatious thing. The greenhouse relieves us of much or all of the annoyance that is often connected with the undertaking of heating beds

Construction of
Frames.

my means of manure. We need cold-frames mostly. The plants can be started in the greenhouse and then pricked out in the cold frames, or later on the larger plants from the greenhouse hardened off in the frames as already directed.

But if we do need hot-beds we must have the right kind of manure. The best for the purpose is horse manure, from well-fed and hard-worked horses. It

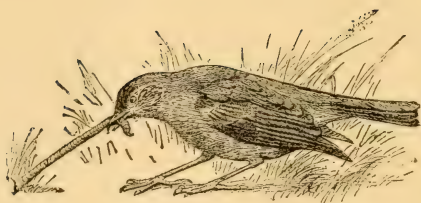
**Manure
for Hot-Beds.**

may contain some urine-soaked litter, or still better, a portion of dry forest leaves that have been used for bed-

ding. If you can get some fresh spent hops from the brewery to mix in with the manure, the proper heating of the material is well assured. Sheep manure will do to mix with the horse manure. Cow manure is too cold. If you have clear horse manure, and it refuses to come to a heat, or if the manure is too wet to heat well, you may add bran or cotton-seed meal, and make a sure thing of it. Fork the manure over a few times, at intervals of a few days, and then pack the steaming mass into a compact layer, and cover with hot-bed soil, say four or five inches deep. For the cold-frames simply put this layer of prepared soil (of moderate fertility for plant growing, very rich for forcing vegetables) upon the ground in the frame. Let the surface of the soil come up as near to the sash glass as the nature of the plants to be grown will allow. The tops of plants should always be near the glass.

In some cases, waste steam of factories becomes available for frame-heating purposes. The steam might be conducted in a very simple manner, inside of common drain tile, lines of which are laid under

the hot-bed soil. But even in this case I would prefer to have a greenhouse or a little pit of some kind, and heat this by the waste steam. Further details of hot-bed and cold-frame construction and management may be learned from the seed catalogues of our leading seedsmen.



PART II.

“A LITTLE PLOT WELL TILLED.”

OPEN AIR OPERATIONS.

CHAPTER VII.

WHAT SHALL WE PLANT?

WE want to make sure to meet conditions, not theories. The mere belief that such and such a crop should and would sell well, is not usually a safe foundation for a trial of such a crop on a very extensive scale. Always try to avoid the very common mistake of raising a lot of stuff which you cannot sell after it is grown. The beginner's first duty and most urgent precaution is to ascertain what crops you can sell to advantage. Even with the greatest care, the grower will not always avoid mistakes, and this perhaps for no fault of his own, for market conditions change, and the same vegetable that is in ready demand and brings good prices one season, may be in excessive supply and hardly salable at low figures the next season. Indeed it is a common thing to see one extreme follow another. This is only the natural result of the tendency of the average grower to rush into a certain line of products as soon as this line gives more than ordinary profits. All this shows that the gardener has much use for good judgment in the selection of his

crops, and in determining how large an area of soil he should plant.

On the other hand the gardener who supplies a regular retail trade must grow a little of everything, and at all times, in order to be sure to supply at any time what his customers may call for. The greater the variety of vegetables that he can offer, the better will be his trade and the better his customers will be satisfied. The prudent way for the beginner, therefore, is to plant comparatively small patches of every kind of vegetables, and many of them, such as radishes, carrots, lettuce, beets, etc., etc., in more or less regular intervals right along in order to be sure of having them in prime condition the whole season through. The only crops which he can plant on a more extensive scale with safety, are those for which he is absolutely sure of finding a ready market. Among such crops may be named the great staples which are not especially perishable, and which, if they find no sale at satisfactory prices in one place, may be readily shipped in bulk or otherwise to other markets, or disposed of through commission houses or other channels of regular trade. Foremost among them are early potatoes (perhaps late ones also), onions, and some of the various fruits.

Under favorable circumstances even perishable crops, such as celery, sweet corn, early peas, string and Lima beans, spinach, root crops, strawberries, raspberries, currants, gooseberries, etc., may be grown extensively and profitably for the commission or shipping trade. Under ordinary circumstances, I think I could give no better general advice

to the beginner in market gardening than to put his reliance for remuneration, at the start, chiefly on staple crops, so as to be sure of a reasonable income, and to plant the various kinds of vegetables in small patches, as already advised, so as to have the materials with which to work up a better paying retail trade. Whether Spring crops are grown for a retail or wholesale trade, however, the one great thing of importance is to have them as much as possible in advance of the rush, or just at a time when the markets are not well supplied and customers appreciate good vegetables most and are willing to pay well for them.

In order to be able to be "first in market," we need, above all other things, a piece of warm, sun-exposed ground. Often it will pay well to pro-

Early Vegetables. provide artificial protection against the sweeping North and West winds by erecting high and tight board fences, or by planting an evergreen screen (spruces, etc.) at the north and west sides of the patch. To fit the soil for early operations in Spring, it should be plowed in narrow beds or ridges in the Fall. A sun-exposed, protected spot of this kind, when Fall-plowed in this way, will be fit for work, and produce hardy crops, weeks in advance of ordinary soils. To make the most of a spot thus favored, prompt action is necessary. Just as soon as the weather and soil conditions will permit (and not a day later), the first seeds should go in and the first plants be set out. Spinach, onions, peas, radishes, lettuce, carrots, beets, etc., are hardy enough to endure quite a cold spell uninjured, if the soil was properly prepared,

sometimes there will be a heavy fall of snow after these vegetables are sowed or planted, but they will come on all right after the snow goes off. To sum up, the conditions of success in producing vegetables earlier than your competitors are: 1. A warm, rich, well-protected spot of ground, sandy loam preferred. 2. Plowing this land in narrow beds in the Fall, or during Winter, if it is an open one. 3. Sowing or planting at the earliest possible moment that the soil can be gotten in thoroughly good working order.

CHAPTER VIII.

MANURES FOR THE GARDEN.

THE manure question is one which deserves the earnest thought and study of every soil tiller, and of the vegetable gardener especially. Without the most liberal use of proper manures there will be no satisfactory cropping, and little chance of profits in gardening. It will pay every gardener to read special works on the philosophy of manures and manure application, such as for instance my "Practical Farm Chemistry."

No soil is fit for gardening purposes unless it is rich, warm, loose and "lively," and it can be so only when containing a large proportion of decaying vegetable matter—the so-called humus. If soil is close and hard, the first thing is to loosen it by additions of this vegetable matter, either by plowing down green crops in combination with liberal dressing of mineral manures, or better and more quickly, by the free application of stable manures. I always consider good compost the mainstay of the gardener,

although under some conditions concentrated commercial fertilizers alone have given me good results, and are perfectly reliable. The possessor of an old market garden usually has the advantage over the new beginner, in having manure-filled soil quickly responding to good treatment, and therefore the benefits of the accumulating effects of annual and heavy manure applications, while the new and perhaps raw soil of the beginner, even with most liberal manuring and the best of tillage, cannot be expected to give full crops at the start. It takes some time, and persistent manuring, to bring up a piece of garden land to its fullest productive capacity, although there are exceptions to this rule.

Where to get the needed supply of stable manure is often a serious problem for the gardener. One horse, one cow, a pig or two, and some hens, which comprise about all the stock that a beginner in market gardening usually keeps, do not produce more than a small part of the manure that he is likely to require. If he lives near the stock yards of a large city, he may be able to purchase all he wants there at reasonable rates.

Sometimes the gardener near smaller cities or near villages may be able to pick up all the manure he can haul home and use, at livery stables, blacksmith's shops, or at private houses, whose owners keep a horse, or cow, etc., no pay, or only a nominal price being asked for it. A ton of good manure, compared with the current rates of concentrated commercial fertilizers, is easily worth \$2. It is seldom that such a price is asked for it. In most places gardeners can have stable manure at not more

than from 50 cents to \$1 per load, and at such rates the gardener can well afford to purchase stable manure to the fullest extent that he can use it to advantage.

Manure that is well rotted and fine is in proper condition to go into the land at once. It can be spread as fast as hauled. Coarse stuff had better be piled up in deep, square heaps, under shelter if possible, allowed to come to hot fermentation, and then be turned from time to time until it breaks down into a fine, dark-colored mass without offensive odor. Frequent turning, and possibly water applications when under shelter, may be absolutely necessary to prevent firefang. I always like to add 10 to 15 pounds of kainit, and as much bone meal or acid phosphate to each load of manure that I put on my land.

**Composting
Manure.**

I have an especially high idea of the value of poultry manure, and always save all the accumulations and scrapings from my poultry houses for the garden. In spring this excellent manure (mixed with the muck, loam or coal ashes used as absorbents) is scattered evenly, but thinly, over the plowed ground, where I intend to plant onions, celery, lettuce and other close-planted vegetables. This manure always gives me the most marked effects on onions and other crops.

Wood ashes is another domestic fertilizer, the value of which can hardly be over estimated. I use all I can pick up, both leached and unleached, the former, of course, more liberally than the latter, and always as a top dressing. In some cases the gardener finds it difficult to

Wood Ashes.

procure all the stable manure he needs. Then other sources of plant food will have to be drawn upon. If a good muck bed is at hand, the task of procuring a manure that will have all the loosening and enlivening effects of compost, becomes a comparatively easy one. Dry, well-seasoned (powdery) muck, freely scattered in privies, stables, sinks, etc., will be transformed into a most excellent garden manure. The available supply of stable manure may also be doubled by composting the fresh manure with an equal bulk of this muck. Finally, a good enough compost can be made out of the muck by composting it with wood ashes (two bushels to the ton of muck) and bone meal (10 to 25 pounds) or with bone and muriate of potash. Without muck I would try to improve the quality of the available stable compost by mixing with it larger quantities of bone meal and muriate of potash, or kainit, and applying the resulting compost in half rations. When stable manure has been freely applied for years and the soil is well supplied with organic matter, we may safely omit this kind of manure for a year or so and rely on concentrated commercial fertilizers alone. In that case 1,000 to 2,000 pounds of bone meal and 200 to 300 pounds of muriate of potash, or in place of the latter, one to two tons of unleached wood ashes or twice that amount of leached wood ashes, may be applied per acre. The applications may be made in fall, winter or very early spring. Dressings of nitrate of soda, 200 to 500 pounds per acre, are always in order for onions, celery, cabbage, beets and many other garden crops.

Of course the various garden crops do not require

an equal amount of manure. Onions, strawberries, celery, cabbage, cauliflower, spinach, lettuce, radishes, cucumbers, egg plants, lima beans, etc., can hardly be given too much. There is no danger even in excessive applications. From sixty to eighty one-horse loads of good compost, or their equivalent, are none too many. The more manure the better the crop. There are other crops, however, which are more modest in their requirements. Thirty to forty loads per acre, or their equivalent, will do well enough for peas, snap beans, carrots, parsnips, potatoes, tomatoes, raspberries and blackberries, or other small fruits.

CHAPTER IX.

THE PERENNIAL CROPS FOR MONEY.

NO garden products can be considered a safer and more reliable source of revenue than the perennials, asparagus, rhubarb, and perhaps some of the small fruits. It should be the first concern of the young market gardener to start a nice plantation of these money crops.

Nice fat stocks of asparagus are always salable and always profitable. And they are easily produced with very little labor. You plant asparagus

Asparagus. roots, and you are sure to raise annual crops, if you give them half a chance; you raise asparagus and you are sure to be able to sell it at a good price. This is more than can be said of all other vegetables, the production of which is easily overdone. Select a rich, warm piece of ground. Manure it well. Plow it deep. If possible, let it be a portion of a patch off one side where it will be a little out of the way, and where these perennials can be left for years without interfering with the proper working of the annual crops. Set a quarter acre at the very least. It will take a thousand plants for a patch of this size, and you can buy them from a near plant grower or nursery-

man for \$3 or \$4. Be sure to get strong one-year plants. Rather pay more for them than set poor, puny plants. Open furrows the long way of the patch, 5 or 6 feet apart. The plants are to be set two feet apart in the rows. It is only the depth of setting them about which there can be any doubt. This depends on the kind of "grass" that our market calls for. If the demand is for blanched stalks, we set the plants not less than six inches deep; if for the green stalks, not less than four inches deep. Still the difference is chiefly one of afterculture. The illustrations here given will make this point clear to everyone.

Fig. 1 shows the way of growing blanched or white stalks. Good level culture is to be given with cultivator and hoe during the first year. Keep the



patch free from weeds and give the plants every chance to grow strong. The year following, when the plants should be old and large enough to yield some "grass," the row may be ridged as shown in illustration. But there is where the important point comes in. The soil directly over the young plants, where the young shoots have to pass through, must be very loose and light, in order to offer as little obstruction as possible to the tender stalks. The latter then grow rapidly and smooth, and therefore as tender and stringless as can be. In short, for growing this kind of asparagus (and it usually sells readily at best prices) you should have over

the plants a sandy loam that is kept loose and porous by an abundance of vegetable matter or humus. Applications of muck may help a hard soil.

When the stalk is an inch or two above ground it is ready to cut. The patch must be gone over, and the stalks gathered at least once a day during the height of the cutting season. Any sharp kitchen knife will do for cutting. Insert the point a little slantingly toward the stalk in such a manner that the latter will be cut off about four inches below the level of the ground. A few inches of each stalk, no matter how grown, next to the root crown, are always tough and stringy, and should be rejected.

For sale, tie the "grass" in neat bunches of about a pound in weight. These bunches are about three inches in diameter and seven or eight inches long. If each plant has plenty of space (as I have advised to set them), the stalks are "fat," often an inch or more in diameter, and it will not take very many to make a bunch. Most market gardeners use a buncher, such as you can buy from any large hardware dealer or professional seedsman. Rubber bands, bast, raffia or some nice colored ribbon may be used as tying material. You can also proceed in the following manner: Take the day's cutting to the wash room, and throw them into the tank with clean water. Take an ordinary large coffee cup. Slip a rubber band of suitable size over the cup. Then take the clean stalks out of the cup and stand them, head down, into the cup until it is as full as can be crowded in. Then slip the rubber band from the cup over the bunch and take the latter out of

the cup. Cut off the butt ends of the bunch evenly, and the bunch is ready for the market.

The other, a simpler and easier way of growing asparagus, is shown in Fig. 2. All you have to do is to set the plants and give them good level cultivation. Cut the plants when six or eight inches high, and bunch as has been directed for blanched stalks.

The beds should be given a rest along in June when green peas take the place of asparagus in the markets. Then let the stuff grow up until fall, when the old stalks are to be cut off and removed



from the patch, with all the seeds still on them. An annual dressing of rotted manure, or of fertilizers, ashes, etc., should not be omitted, and a few hundred pounds of nitrate of soda per acre scattered over the patch in early spring will usually give good returns.

As to varieties, I think the old Conover's Colossal is yet as good as any other. There are quite a number of so-called "improved" sorts, but I have never been able to see much difference between them. If you can buy the "Mammoth," or Palmetto, etc., without having to pay fancy figures for novelties, you will be perfectly safe in planting them. The latest introduction in this line is the Columbian Mammoth White. It is especially recommended for its white stalks. It may therefore be preferable when we grow asparagus by the method shown in Fig. 2. If we grow and cut our stalks under ground,

as in the first described method, we will have white stalks anyway, and will not need a self-blanching sort, a White Plume among the asparagus.

The rhubarb patch may adjoin the asparagus bed, rows running the same (long) way. Make them four feet apart, and set good, strong plants four feet apart in the row. The soil should be

Rhubarb. made very rich and plowed deep. You cannot use good, old manure too freely, nor cultivate too thoroughly. The second season, when the plants are making strong growth, begin to pull. Pull the leaf stalks, trim off most of the leaf growth, tie in bunches of a few pounds each and sell. They are usually in good demand at prices that make the crop a profitable one. In order to have plants for a future extension of bed, it will be well to sow a little seed every few years, in same way as you would sow parsnip or similar seed. The plants are easily grown under ordinary, clean cultivation, and the strongest growing ones among them may be picked out and saved for starting the new patch.

The Egyptian or Tree Onion should also find a place in a corner out of the way with the other permanent beds, the herbs, asparagus, rhubarb, etc. I

Winter Onions. mention it here because it is a favorite for bunching. It is not a good onion, does not make a bulb proper, and is not of good flavor. But it sells, as other green stuff is scarce and often entirely absent at the time when we can get plenty of these winter onions. They are about the hardiest of all vegetables, and will grow luxuriantly as long as the ground is not actually frozen up. They are also immensely productive,

and a little corner of them will furnish great quantities of thick, green stalks. They also force well under glass, and can be used to yield plenty of green onions (or something resembling them) during the cold season, even in a rather cold greenhouse. In short, while I would not want this vegetable for my own use, there are few that can be made more profitable for market, under ordinary culture as well as by forcing. You can start a bed of them in spring or fall by planting sets.

Another crop that the young market gardener must have, and which is sure to bring good profits if well managed, is the strawberry. You will want

Strawberries. at least half an acre. Select a rich, clean loam, if possible, and set good,

strong plants of Bubach, Haverland, Crescent or any other very productive variety, new or old, as long as it is suitable to your soil and locality, not to forget to mix in an occasional row or two of some good perfect-flowering sort, like Warfield, Wilson, Beder Wood, etc. This is for the purpose of providing the needed pollen in the required or desirable abundance. The best way for the young market gardener (and old one too) is to set a new patch early every spring, and plow up the old patch soon after the first crop is off. Have rows four feet apart, and plants 18 to 24 inches apart in the row. We set the plants with a spade, and it is quick work. The young patch needs prompt attention with the Planet Jr. horse wheel-hoe all season long to keep it scrupulously free from weeds. When the ground is frozen up in late fall or early winter, put a coat of marsh hay all over the whole patch for a mulch. This is

to be removed in the spring and the bare spaces between the rows stirred up with a fine-toothed and very narrow cultivator. After that the mulch may be put back between the rows, leaving only the plants without cover. This will discourage the weeds long enough to keep them down until after the crop is gathered. The patch can then be plowed up and utilized for the production of a crop of late potatoes, late celery, fall spinach, carrots, radishes, turnips, or possibly others.

I would also strongly advise the young market gardener to have a patch of raspberries, especially the red sorts where they sell well, of blackberries, currants and gooseberries. All these

Other Fruits.

crops pay quite well where they can be sold at the usual retail rates. The same may be said of grapes and all other fruits. If you have land for the purpose, set out a good supply of all such crops. They will sell with the rest of the stuff, and do not require very much space on the wagon compared with the amount of money they bring. It is always well to have a variety of products with which to tempt customers. One thing sells another. The proper location for these fruits, of course, is with the other perennial crops, the asparagus, rhubarb, etc., and a little off one side, to interfere as little as possible with the proper working of the ever-changing vegetable crops.

CHAPTER X.

EARLY CROPS FOR EARLY MONEY.

AS SOON as the ground is ready to receive them, seed of the early crops should go in without delay. On the whole, the job of seed sowing, on a moderate scale, does not require much time, and therefore does not interfere much with the work of setting plants. No matter how pressing that may be, we always let seed sowing take the precedence of plant setting. We want to get the seeds into the ground and have them growing just as soon as this is practicable. Among the early money crops, we have early peas as one of the foremost and most important. It continues to bring in the money at the end of the asparagus season, and during strawberry time. Strawberries and the more bulky green peas fit well together on the vegetable wagon.

With this crop we are in an especial hurry, for on its earliness depends its price, and sometimes its ready sale. The variety we want is one of the first early smooth sorts, such as Alaska, Station, Rural New Yorker, Maule's Extra Early, Earliest and Best, or even the older Dan O'Rourke and Philadelphia. There is not so very much difference between all of these, and which ever of them you will select will give you a good crop of very early peas if you manage them with discretion. All of them can stand very rich ground,

Green Peas.

although one of moderate fertility is all they require. We open the furrows with the Planet Jr. furrowing attachment to the horse hoe, making them about two feet or more apart. On very rich soil we should have them three feet apart. We make a quart of seed reach over about 200 feet of row. The covering is done with the feet, or with a hoe, or with the hillers of the Planet Jr., horse hoe, or with any other covering device. To keep the ground in good tilth and free from weeds, we use the Breed weeder as often as seems needed, and think there is no tool equal to it for the purpose. When you have no Breed weeder, use any good horse cultivator. If slugs become troublesome, we soon get rid of them by spraying the plants, after dusk, with salt water, or dusting them, at the same time of day, with lime.

As the picking season approaches, make sure of having pickers enough. Perhaps you can let them pick strawberries one day and peas the next. Usually you will find ready sale for these first early peas at prices ranging from 40 cents per peck at the start, down to 20 or 25 cents per peck during the height of the peas season. Make a careful estimate of the quantity of green peas you can handle advantageously, and be sure to plant no more than that. Green peas are an inexpensive and easy crop to grow, and at \$1 a bushel they are quite profitable. The vines can be cleared off in time to grow on the same land a crop of late potatoes, celery, cucumbers, pickles, or beets, radishes, turnips, spinach, etc. For a discriminating market we may grow the early wrinkled peas for main crop, such as McLean's Little Gem, Nott's Excelsior, Bliss' Abundance and

Everbearing and others. Sometimes there is a good demand for green peas later in the season. The Champion of England is very late, very good in quality, and unfortunately very tall. Farmers often sow it in larger blocks broadcast. The market gardener should brush it, or select a more dwarf growing variety.

Another crop that we want to get into the ground just as soon as the soil can be got in shape, is that of sets for bunching. I class onion sets with seeds,

**Onions
for Bunching.**

for I sow them into furrows as I would peas, trying to have one set to the inch or inch and a half. The old way of pressing each set separately into the soil with the fingers is too slow and tiresome. The sets can stand much closer crowding than is generally given them. Why waste so much space and so much labor? Simply open furrows by means of a hand plow (for instance the plow attachment to the Planet Jr. hand wheel hoe) about two inches deep. Have them a foot apart, and in them scatter the sets as already mentioned; then cover with the same plow, or with the feet or a hoe, as you may prefer. In this way a good lot of sets are easily and quickly planted. They will need only a moderate amount of hand labor; running over them a few times with the hand wheel hoe, and hoeing out stray weeds being all that will be required. The crop, therefore, is not an expensive one, and as there is usually a ready demand for the bunches of from a dozen down to six of the green onions (according to size of the specimens) at about five cents for two bunches, it gives good returns for the labor and outlay.

CHAPTER XI.

VEGETABLES FROM SEED.

FOR the whole list of vegetables that are to be planted in close rows, such as beets, carrots, radishes, spinach, celery for soup and plants, parsley, etc., I prepare the land in a lump all at once. One cannot be too thorough in making a nice seed bed. Plow deep and well, and then use the harrow, going over the patch time and time again until the surface is as smooth and free from lumps as a floor. The tools we use in preparing ground for these crops

Preparing
the Seed Bed.

are an ordinary smoothing harrow (or drag), and the Meeker harrow or pulverizer. As long as any lumps remain, we change from one to another of these two implements, using first the drag, then the Meeker, then the drag again, and so forth. We should not be like some doctors—do poor work and cover it with earth. It will not do to have the soil underneath lumpy and just an inch or two on top smooth and fine. The soil should be as “mellow as an ash heap,” clear down to the subsoil. If necessary, we prepare the land as well as we can by one plowing and repeated harrowing, and then plow and harrow again, thus working the soil “on both sides.” Indeed this will often pay exceedingly well. I sometimes plow patches even a third time. The whole field intended for the small stuff is plowed and fitted

as early in spring as the weather and condition of soil will allow. The rows are marked out a foot apart as we need them for planting. Then we drill in the spinach, the radishes, the beets, celery for the main crop, carrots, etc., and at once begin to set our onion, beet and lettuce plants, cabbage and cauliflower plants, etc.

A couple of weeks or so later we may wish to sow another lot of radishes and other vegetables, salsify, parsnip, etc., and before we do that we would better freshen up the plat yet to be planted, by plowing or, anyway, by re-harrowing. A crop of weeds is killed at the same time and in the easiest and most thorough manner. Now we can continue our planting and seed sowing and have the best soil conditions for our work.

Spinach is one of our very hardiest crops, and seed can be sowed very early in spring, and again in September for late fall and winter crops, and in

October for winter and spring crop.

Spinach.

The differences between the leading varieties are slight. I prefer Long-Standing Summer spinach, especially for spring planting. Sow seed with the drill. The indicator will tell you how to set it for sowing this seed. Don't raise more than you are reasonably sure that you can sell. If demand and prices are good when the plants have made some, but not their full growth, it may in some cases pay to thin them, leaving the remaining ones three or four inches apart to come to full size, and selling the thinnings. We use ordinary ten-quart peach baskets in which to put up the crop for market. Or the plants may be put in bushel crates

or barrels, and sold by the peck or other measure, or by the barrel to retailers. Usually we cut the whole rows down as fast as the crop is needed for sale, pushing a sharp and bright "crescent" hoe under the plants just on top of the ground, thus cutting the plants off and leaving them ready for gathering, washing and putting up for market. Applications of nitrate of soda often have a wonderful effect on this crop. If we are crowded for room, we sow a row of spinach between each two rows of early cabbages. The spinach has to be taken off in good season, when all the space is needed for cabbages.

Radishes, with us, are chiefly a catch crop or filler. In some cases we sow a little patch all by themselves. Usually we sow a row between each two rows of early cauliflower, early cabbage, and perhaps other crops that are planted in rows two or more feet apart, and which do not need all this space for four or five weeks. At the end of that time the radishes are all off, and the row can be cultivated and hoed. Often there is a good local demand for radishes, and for whatever kind of radishes this demand is, this kind we must plant. I usually plant only the quick-growing, early turnip-rooted sorts, such as Early Scarlet Forcing, Early Erfurt, Earliest Deep Scarlet Turnip, and a score of others which differ from these mostly in name. French Breakfast is a favorite in some markets, while in others the long or half-long varieties, such as Long Scarlet, White Strassburg, etc., find most favor with buyers.

The market gardener, in order to have a continu-

ous supply, must sow a row or two every few days. Sometimes the weather or other conditions are not just right for one sowing, and the whole may be entirely worthless, or ruined by maggots. By sowing often, a row here and a row there, wherever a little strip becomes available, we have others coming on should one lot be of no account. We also mix a small proportion of seed of some early turnip-rooted sorts with our carrot, beet and asparagus seed. The radishes are soon taken up and out of the way of the regular crop. Sandy soil and plenty of old compost are good things for radishes.

Celery plants for the main (fall or winter) crop are usually readily salable, and will bring in quite a little money. We want not only our own supply of

Celery. good plants, but all that we think we can sell beside. The richest and warmest spot of ground on the premises is, therefore, reserved for the celery plants. Giant Pascal is now the leading sort. Rows are marked out, rather shallow, one foot apart, and the seed is sown by hand, an ounce being sufficient for at least 200 feet row. You may draw the rake along lengthwise of the rows, thus covering the seed very lightly. I usually walk on the row heel-to-toe fashion, and seldom fail to have good success in getting the plants to start promptly and evenly. The wheel-hoe must be started just as soon as some of the plants show above ground. Let the knives run close to the row to narrow it down to an inch or so. There will be too many plants anyway, and this is as good a way of preliminary thinning as any. Soon after we follow with the hand weeder, destroying what weeds may have started,

and at the same time narrowing the row of plants still more, so that we have from twenty-five to fifty left to the running foot. You can easily raise 100,000 good plants and more on one-tenth of an acre of suitable soil, and if all sold, even at only \$2 per thousand, they would bring \$200 at the very lowest calculation. We like to give them an occasional top-dressing of nitrate of soda, say a pound to the square rod. The tops may grow very rank. In that case it will be well, or even necessary, for the sake of getting short and stocky plants, to clip off a good share of the rank growth. These clippings or shearings will come in handy for soup celery. Tie in a bunch all that you can encircle with thumb and the fingers of one hand, just as you would tie and sell parsley.

Parsley is required to a limited amount in every market garden. Sow seed in same way as you would celery or carrot. Firm the ground well, and thin the plants to stand an inch or two apart in the row. In most markets the tops alone are used, tied in bunches same as soup celery. Sometimes the entire plants are wanted. They are pulled up, washed and tied in bunches.

To have table beets ready for market at the earliest possible date, we must set the nice, strong plants grown under glass, in open ground as early as that is in proper shape. The rows are to be one foot apart, and the plants may be set three or four inches apart. But we will need a continuous supply, and therefore must also sow seed in open ground at same time, and every few weeks after that as long as we expect to have call for the

crop. Eclipse is the leading sort. We use the garden drill, but always set it to sow less seed than directed on the indicator. Seed of these early table sorts is much smaller than that of the larger sorts. Weeding and thinning (to stand three or four inches apart in the row) must be promptly seen to. The young beets, when of suitable size, are pulled, washed and tied in bunches of four to six each. The thinnings may be sold for greens. Nitrate of soda will help the crop, same as it does spinach, etc.

Carrots, like beets, should be sown as early as the ground can be worked, and quite often during the season, in order to have a continuous supply of fresh,

Carrots.

young, tender carrots. Early Scarlet Horn, Oxheart, and Earliest Forcing are what we want for our purposes. At first we use the carrots quite small, as soup carrots, tying them in bunches like radishes or beets. Seed may be sown with the drill. Cultivate, weed and thin promptly.

There are also a few other vegetables, seed of which may be sown early, if we choose, but which we are not quite in such a hurry to sow as we are to sow those already named. Among them we have parsnips, salsify, pickling onions, etc.

Our aim is to get the seed of vegetables, which we must and will have at the earliest possible moment, into the ground and growing just as soon and as quickly as as we can, and then begin setting our lettuce, cabbage, cauliflower and onion plants.

CHAPTER XII.

EARLY PLANTS AND LATER CROPS.

THE first of our plants to go from cold frame to open ground in spring, are the lettuce plants. We mark the ground, otherwise prepared as for vegetables from seed, in rows one foot apart, and if we have plenty of room, set the plants one foot apart in the rows; although nine inches distance between the plants, with the rows a foot apart, would be ample. Our aim must be to make the plants take a fresh start and “come to a head” as soon as practicable, and for this reason we should take up the plants with all the roots and as much soil adhering to them as needed to prevent any check whatever to their growth. Then carry them to the patch with proper care, and set in their proper places with considerable firmness. Cultivate as you do all other close-planted small vegetable crops, namely, the oftener the better, and sell when large enough. Usually there is a good demand for this first early outdoor lettuce, at good prices. Cabbage and cauliflower plants, when taken up with the same care as recommended for lettuce plants, and set out firmly in rich garden soil, two feet apart each way, will also grow right along, and give an early, salable and usually

Setting
the Early Plants.

profitable crop. Our plan is to drill in a row of radishes or spinach between each two rows of early cabbage and cauliflower. Cultivate and hoe often and thoroughly. Applications of nitrate of soda, a small handful around each plant, will seldom fail to give good results and fine cabbages. One of the easiest methods of preventing injury by maggot, lice and worms, is to throw a small handful of tobacco dust into the heart of each plant while young, and to blow the same material all over the plant when larger, with a powder bellows. Spraying with salt water or a solution of muriate of potash, or of kainit, will also clear these plants of worms, etc. A spoonful of salt sprinkled over the plants will do the same.

Next come the Prizetaker or other onion plants. Pull them up carefully from the flats or seed-bed, trim off the tips of the roots and also a portion of the top, and then "dibble" or "finger" them into the loose soil in the rows one foot apart, and the plants three inches apart in the rows. You can set them from one to two inches deep. Press the soil firmly to the roots.

This job of setting onion plants we will do well to hurry up and carry to completion as quickly as possible. The sooner good plants are out in spring, the sooner they will take a new start in open ground, and the sooner they will give us good bulbs, either for bunching or to be sold as dry onions. The market gardener has use for them in both shapes. Sometimes it will pay well to pull up gradually a portion of the crop and market as green onions, for even if we lose a good deal of growth and bulk, the

price is usually quite acceptable. At any rate, by crowding these green onions on the market while they sell well, we insure an early sale of the crop at good, and often far better, prices than we could obtain for the full-grown crop of dry onions in the fall.

By the time that onion seedlings are set out, we will be ready for sowing parsnip, salsify, pickling onions, etc. For parsnip and salsify the land is prepared as for beets or carrots, and the seed may be sown by hand in shallow drills a foot apart. Both crops are to be marketed in winter or early spring, but only a small patch of them will probably be needed. The culture is about the same as for carrots. Plants for winter market must be taken up in the fall, and stored in a cellar or root house; those for spring market are left in the ground over winter. Pickling onions are an important crop. I use the Barletta altogethery, and find it to pay well even if the crop has to be sold through regular commission channels. Sow seed with garden drill, in rows one foot apart, using at the rate of 40 to 60 pounds per acre. Go through the rows a few times with the wheel hoe and give at least one thorough hand weeding. But the bulbs begin to ripen up early in July, and by the middle or end of the month may be taken up, cured and cleaned for immediate sale. I usually ship mine in peach baskets, lined with paper and covered with a cover of strawboard. These onions usually bring me 10 cents a quart at wholesale.

Of course we want some early potatoes to sell

with the rest of the vegetables, and we want them as early as as we can possibly get them, for the early ones bring the price. We there-

Early Potatoes. fore select the earliest sort we can find. I use the Early Ohio for this purpose altogether. It is days, perhaps weeks, earlier than other so-called early potatoes (like Early Rose, Hebron, etc.). The Early Ohio wants good, strong loam. Seed should be spread out in a light, warm room—say under the greenhouse benches—in February or early March. It will “green” and start some short but strong sprouts, and when planted out, in drills four inches deep and two and one-half to two and three-fourths feet apart, with pieces 12 inches apart in the rows, will start up promptly and give an early crop. The Early Ohio will bear heavy seeding. I always plant medium-sized tubers whole, and larger ones just cut in halves. The potato beetles will lie in wait for the plants, being the first food they can get, and they will often pounce upon them when the plants are only just breaking through the ground. We dispose of these first comers by hand-picking, and later on use Paris green (applied in water or as powder) to kill the slugs. You can commence digging the crop when the stalks just show a slight tendency to turn yellow. Level cultivation (or nearly so) is, on the whole, preferable to much hilling.

The market gardener who has a general retail trade and the necessary land, may also raise a moderate quantity of late potatoes. By

Late Potatoes. selling them, along with his other stuff, in small quantities, by the peck or half bushel, he will secure the highest retail rates, and this will

pay him even in a season of low prices. The Freeman will do well on rich loams, and for customers who appreciate high quality, may be relied on to give satisfaction. For sale among indiscriminating buyers, I think I would prefer the big yielders, like Rural New Yorker No. 2, the Carmans and others, which can be depended upon for big crops even in ordinary potato soil. Give garden culture (i. e., frequent and thorough cultivation) and you will grow garden yields (i. e., large amounts on a small area). Late potatoes may be planted any time from May to July. Sometimes we can raise them profitably on land just cleared from early peas, lettuce, radishes, beets, spinach, strawberries, etc.

Plenty of Sweet Corn may be planted if there is room for it. By planting Cory, or some equally good early sort, just as soon as the ground has become warm enough to sprout the seed, we will usually insure a supply of fairly good corn very early. It will pay us to run a little risk, and my experience is that this early corn is seldom hurt much by a late frost. A little later we may plant the larger and later kinds, especially Evergreen. It is a handy crop, both for its yield of ears and for the stalks, which make such excellent fodder for the family cow, or the horse either.

When the ground has become warmed through, and danger from late freezes is nearly past, we may begin to plant seed of melons, cucumbers and squashes in open ground. The location, of course, should be warm, the soil heavily manured and well prepared. The early cucumbers and melons, like most other early stuff, catch the

Sweet Corn.

Vines.

price. My plan to secure earliness is to utilize all the sashes possible (even those of common windows, wherever they can be spared at this time, from out-buildings, etc.). Set little frames at proper distances all over the patch; plant a hill, or two or three hills, in the centre of the frame, in the usual way, and cover with the sashes, giving more or less ventilation, according to the season and weather. The plants here start up nicely, are reasonably protected against insect attacks, and grow right along. If bugs do find their way under the glass, and endanger the safety of the plants, a live toad may be put into the frame. It will make short work of the bugs. Along in June the sashes are taken off entirely, and a week or two later the frames also. White Spine and Improved Long Green are good varieties of cucumbers.

Among melons I know of nothing better than Emerald Gem. It is a rare gem indeed, so far as quality is concerned, and far ahead in earliness of any other melon variety with which I am acquainted. But it is small and not a fill-basket. To make the most of it you want to use rich soil and to plant quite close, four feet distance between the hills each way usually being sufficient; and to have a succession during the entire season you must make later plantings, even well up to July. Customers who appreciate a good thing will want no other melon after they once have a taste of the Emerald Gem. Tip-Top, however, is also good, and for a general run of customers you may have to plant larger sorts, too, like Nutmeg, Miller's Cream, etc.

Only a moderate number of summer squashes will

usually be required. I prefer Summer Crookneck, but in some markets other sorts, such as White Bush Scalloped, etc., take the lead. Plant either of them in hills, about four feet apart each way. The plants are somewhat hardier than most other vines.

For winter squashes nothing better has yet been found than the old Hubbard. It wants rich soil and plenty of room. Have the hills ten or twelve feet apart each way, and leave only two good plants to the hill. The market gardener may not have so much room for so spreading a crop, but if he has, he can do far worse than plant Hubbards. The squashes keep well in a dry room and a temperature of about 60 degrees Fahrenheit, and can be sold at two or three cents a pound retail, all winter long. Be sure that you use tobacco dust or bone meal, or better, a mixture of both, freely, all around the different vines while the plants are small. A better bug preventive has never yet been found. The ground around the young plants may be kept covered an inch deep with the mixture. It will help the plants, too, rather than hurt them.

Not until after all danger from late frosts is past, here usually the first of June, the time has come to transfer the tender greenhouse-grown plants to open ground. Tomatoes are the first ones among them to go out. Our early ones (Early Leader, Ruby, Maule's Earliest, New Imperial), all of which stand in large-sized wooden plant boxes, are now in bloom, and even well set with fruit. We set them four feet apart each way, usually leaving the boxes on. Of course these large stocky plants grow right along,

Setting
Plants Again.

and will have ripe fruit in July, when it always brings a good price. If we have a fair sprinkling of New Imperial among these plants, we can also depend on having a good supply of excellent late tomatoes, and probably all we want for our trade, for late tomatoes are easily produced in large quantities, and are usually in heavy supply, and a drug on the market. Egg plants also sell well to a limited extent. Set a reasonable number of plants in same way as tomatoes, only about twice as close, namely, two feet apart in the rows, and the latter three or four feet apart. Soil should be very rich, which is not so necessary for tomatoes. Pepper plants (Ruby King), can be set still closer. The cucumber, melon and squash plants started in boxes or pots, under glass, are the next, and perhaps the last, to be set in open ground. Have the hills as far apart as made when seed is sown in open ground, and set the plants, boxes and all. Firm the soil around the plants well with the feet, and at once cover with the tobacco and bone dust mixture as already has been mentioned.

Celery is a most important crop, and one that usually pays well. When you have good plants to set in May, you have about solved the problem of raising a good crop of early celery. You can set the plants in rows, the rows being 2 or 2½ feet apart, and the plants 5 inches apart in the rows. Give good cultivation at all times, and copious applications of water during dry weather. Blanch with boards. Or you may set the plants in the hotbeds and cold frames, then out of use, say six inches apart each way, and give plenty of water

right along, whether it rains occasionally or not. For late celery set Giant Pascal plants in July, making the rows from three to four feet apart, and setting the plants five inches apart in the rows. Of course the ground should be well enriched. In September earth up or blanch with boards. Plants for Winter or Spring use need not be fully blanched, and can be stored in trenches or regular root house.

Little remains to be said on the subjects of seed sowing and plant setting, except that the whole area of the market garden should be kept producing something all season long. When one crop is off another must be put in. The successful market gardener is harvesting and planting all the time. By all means crowd the crops all that it is possible to do. Never leave even a little patch unoccupied. The idle land breeds weeds.

All the necessary directions about cultivation of garden crops may be crowded into a few words:

Cultivation. keep the wheel-hoes, both for hand and horse use, going all the time, and let no weed show its head above the ground without hitting it at once. In short, give weeds no show whatever, and keep the surface of the ground well pulverized at all times. This is all anyone can do, and what all must do in order to secure maximum crops. Do this, and you do your part. Then trust in Providence. It is useless to be ever so trustful with folded hands.

PART III.

“A LITTLE PURSE WELL
FILLED.”

WORKING THE MARKET.

CHAPTER XIII.

WAYS OF SELLING.

TO RAISE good garden products may sometimes have its difficulties. These the good gardeners have learned to overcome, and it is for this reason that vegetables are now so abundant and cheap in the wholesale markets. Far greater difficulties than are met in growing vegetables are in the way of securing satisfactory prices for them. The market gardener, even if he knows how to grow good vegetables, cannot hope to make a financial success of it, unless he also finds ways of getting them before appreciative buyers. The marketing question, indeed, is the one great problem which many otherwise good gardeners have not yet learned to solve to their satisfaction and profit.

Ways of
Selling.

In the first place every gardener has to adjust the marketing feature of his business to his surroundings and the conditions of his available markets. Sometimes he will find it most convenient, and most satisfactory in the long run, to sell his berries, potatoes, onions and celery, etc., to grocery stores and other retailers. In other places, he will have to go on the open market first, selling to whoever comes along and is willing to pay his prices, and

afterwards peddle to consumers or storekeepers what is left after market hours; or he may prefer to peddle all his produce directly to consumers. My experience with commission merchants (although I appreciate all the difficulties of their situation) is that I send products to them only when I cannot sell directly to customers.

**Commission
Dealings.**

The average young market gardener will yet find it the best way to hunt up a retail trade, either in the city market, selling from his stand or wagon, by establishing a regular peddler's route, or in both ways. But the market must be "worked" rather than left to take care of itself.

In the first place, grow first-class garden stuff. Have a clean, tastily painted and conveniently arranged, covered market wagon, drawn by a good looking horse or team, in bright, clean harness. Employ a good salesman (even if only for a month, if you prefer to do your own peddling) to establish a route in the better quarters of the city. Make regular trips, and always carry a variety of good products, even if you must buy a portion of them. Make friends with the people along your route. Ask fair, but not extravagant prices. Always deal fairly and honestly by your customers, invariably giving good measure. Don't crowd a poor article on any customer. If you follow these rules, I am sure you can establish a trade that will pay you well.

CHAPTER XIV.

PREPARING VEGETABLES FOR MARKET.

IN SELLING vegetables, our aim always must be to tempt the buyer, not only by superior quality of the goods offered to them, but also by their neat and appetizing appearance. You should put your berries, etc., in clean and neat packages. Always

**New Fruit
in New Packages.**

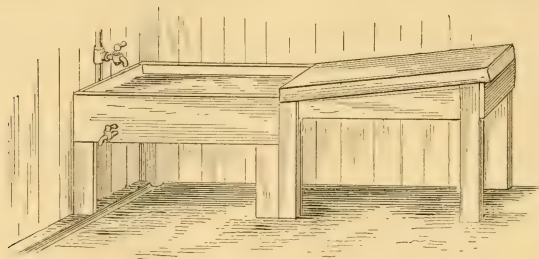
manage so that the basket can go with the fruit, and use new baskets on the next trip. Baskets and packages can be had at very little cost now-a-days, and it pays to use new ones every time. Never use a stained package. Never use a clumsy one.

In bunching vegetables follow the customs of your particular market. See how others do it, and then try to do a little better. All vegetables should be

**Washing
Vegetables.**

cleaned with scrupulous care. You should have a tank with a supply and escape pipe, and a wash table or stand near it, somewhat on the plan suggested in the illustration. Wash and scrub, with brushes, etc., every lot of vegetables until not a speck of dirt remains on them. Then tie neatly in bunches of just such a size as the market demands. When a

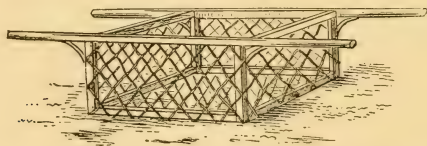
certain kind of vegetable is scarce, because offered out of its regular season, or for other causes, the bunches may be made smaller, and in time of



TANK AND TABLE FOR WASHING VEGETABLES.

plentiful supply they will have to be made larger. It is a point for nice discrimination and good judgment.

A New Jersey gardener (Chas. Beck) suggests the use of a crate, made of slats or wire screen, etc., as here shown, for washing vegetables. The crate can



CRATE FOR WASHING VEGETABLES.

be filled with roots, or potatoes, or whatever is to be washed. Two persons take hold of it, and may raise or lower it into a tank of water, and by shaking it, etc., soon wash the vegetables clean. Clean vegetables sell much more quickly than dirty ones.

APPENDIX.

A FINAL SUGGESTION.

ANOTHER thing that the young market gardener cannot neglect save at the risk of a good portion of his success and profits, is to read good horticultural literature. Good journals keep you informed about modern improvement in methods and the value of newly introduced varieties. In many cases the announcement of novelties offered by the seed and nursery trade may savor of Barnumism, but sometimes one really good new thing will bring many dollars into the pockets of the gardener who recognizes the value of the novelty early, and takes hold of it promptly.

**Horticultural
Journals.**

Full details of growing all the different vegetable crops are found in "How to Make the Garden Pay" (price, \$2.00), and the young market gardener will need this book as a special guide in his business. Being revised in 1895, it is fully up to the times, and contains complete chapters on the best methods

**How to Make the
Garden Pay.**

of overcoming the fungus and insect enemies of garden crops.

Then a study of "Practical Farm Chemistry" (price, \$1.00 bound, 50 cents paper) will give you a clear insight into the character of the different

**Practical
Farm Chemistry.**

manures, and show you how to use them intelligently and with best effects. It is written plainly and practically, and with the avoidance of all scientific phraseology, so that anybody of ordinary schooling and ordinary intelligence can understand. The work itself is not as formidable as its title might lead to infer. It is thoroughly practical, and really a treatise on "Manures, Where to Get and How to Use Them."

I find as much money in onions as in any other garden crop. Possibly this may be the case with you. At any rate, it will pay you to read "The New Onion Culture," (price, 50 cents). It gives full in-

**The New
Onion Culture.**

structions about the new method which we practice with such gratifying results. In short, be a reader and thinker as well as a worker.

Another money crop is celery, and in many cases the young market gardener can do far worse than make this one of his specialties. If he does, he

should study "Celery for Profit" (price 30 cents), which is published as an expose of modern methods in celery growing, and gives all the details of the business that the grower for market should know or try to learn.

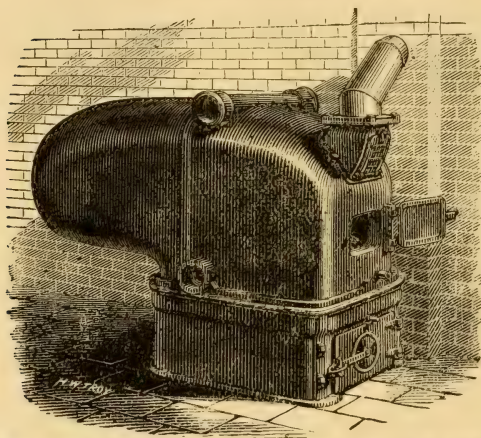
Celery for Profit.

Prof. Taft's book on "Greenhouse Construction and Heating" (price \$1.50), has already been mentioned. When the young market gardener's business extends and compels him to build more and larger houses, he will find the perusal of this work of great help.

The books here mentioned may be obtained from the author, to whom orders for book, with price for same, should be addressed at La Salle, Niagara County, N. Y., or from any agricultural paper or general book store.

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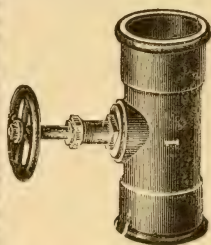
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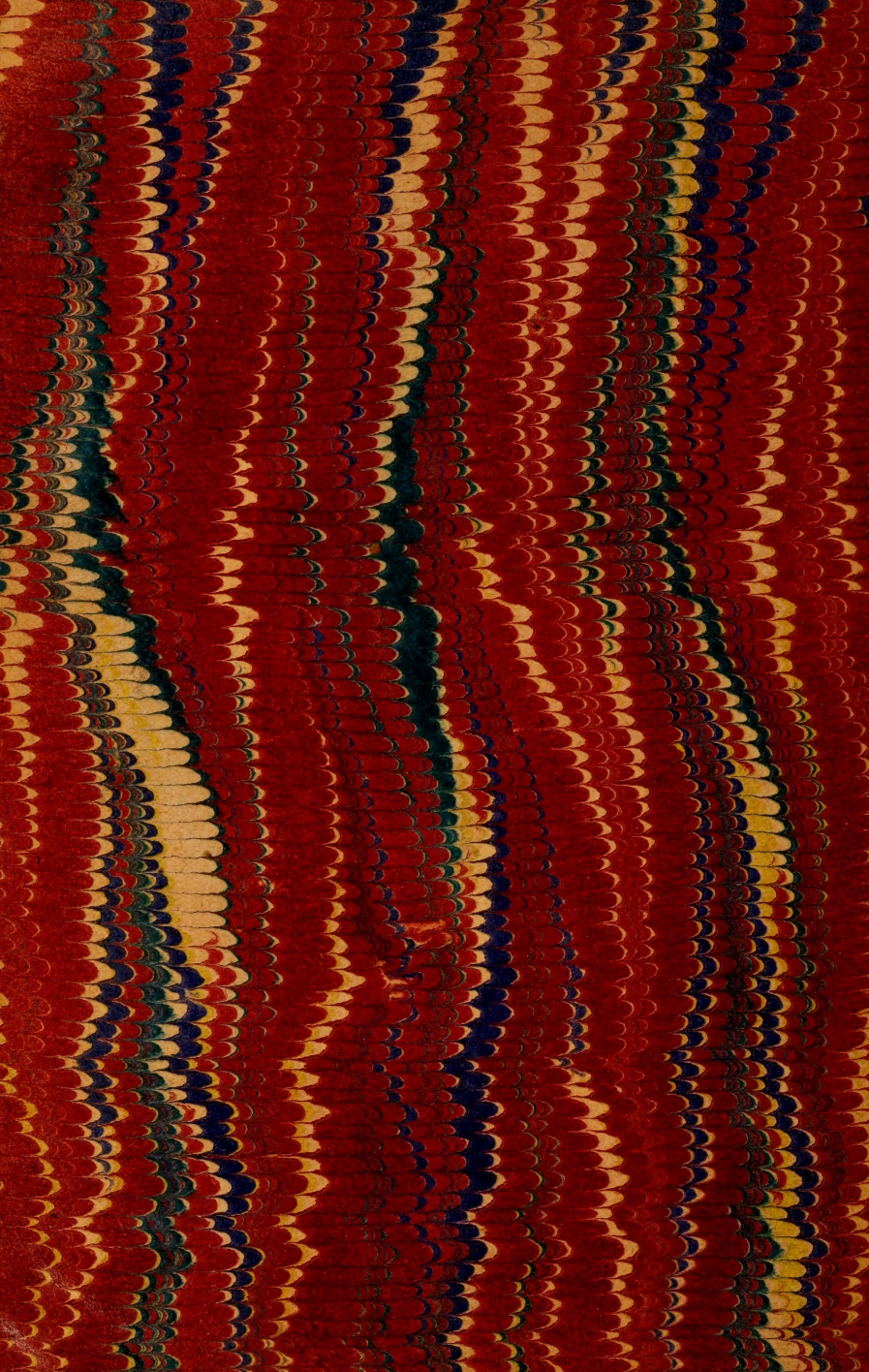
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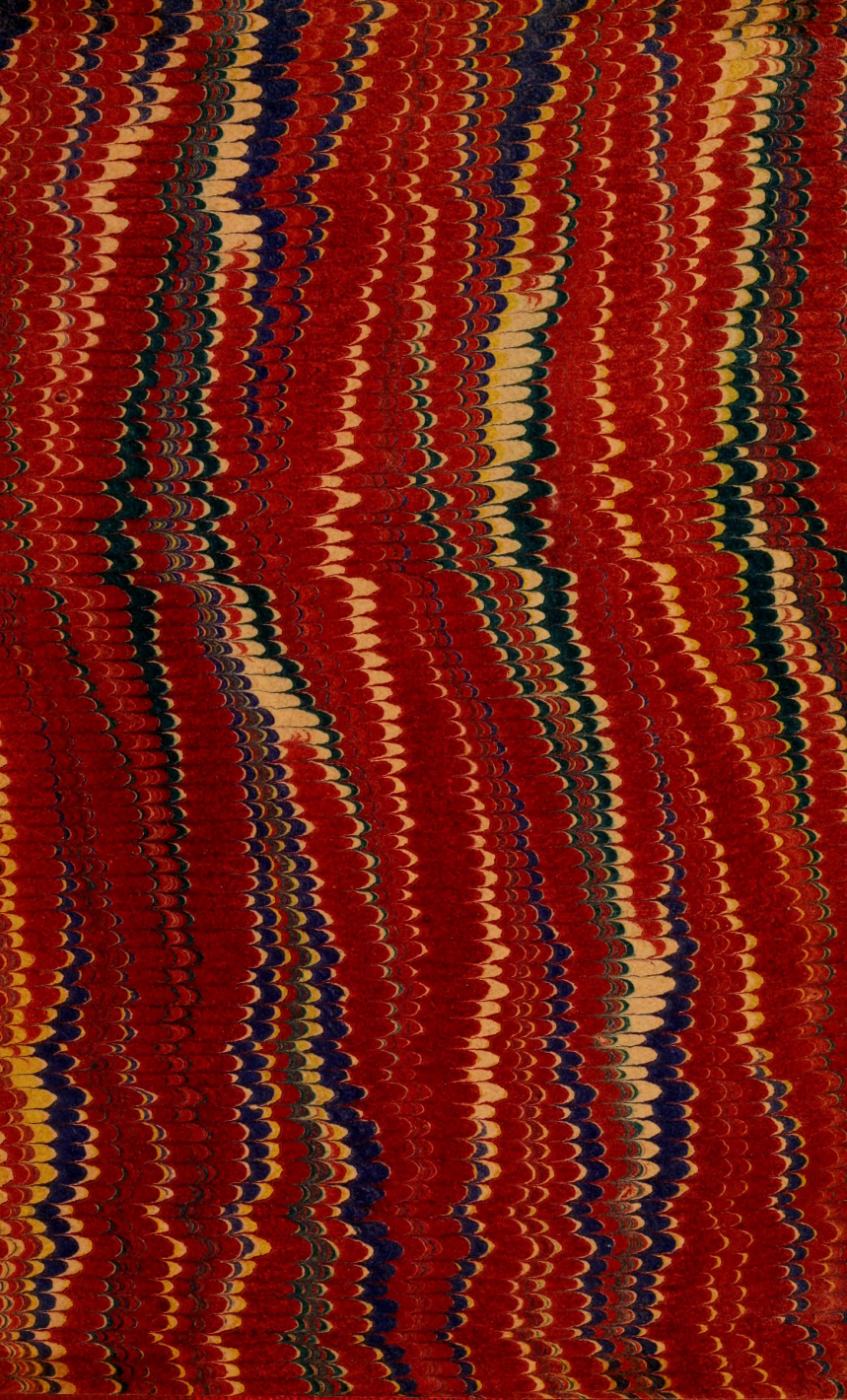
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